RUSS OLSON VOLUME 3A

TWIN CITY RAPID TRANSIT CO.

TRACK CONSTRUCTION: HORSECAR AND CABLECAR LINES

Sub-divisions Within this Volume

- Contents of the Front Pocket
- Introduction: Lack of Early Records
- Minneapolis Horsecar Tracks
- St. Paul Horsecar Tracks
- Cablecar Lines St. Paul-Constructed; Minneapolis – Proposed
- Contents of the Back Pocket

CONTENTS OF
FRONT POCKET

The Cable Car in America

A New Treatise upon Cable or Rope Traction as Applied to the Working of Street and Other Railways

by GEORGE W. HILTON

CARTOGRAPHY BY JAMES A. BIER

Howell-North Books
BERKELEY, CALIFORNIA • 1971

THE CABLE CAR IN AMERICA

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Printed and bound in the United States of America

Library of Congress Catalog Card No. 76-156352

ISBN 0-8310-7082-0

Published by HOWELL-NORTH BOOKS
1050 Parker Street, Berkeley, California 94710

INTRODUCTION: LACK OF EARLY RECORDS

LACK OF EARLY RECORDS

In the early years of my research I was told that a fire in the storehouse-office building at the 31st St. Shops in Minneapolis resulted in the destruction of many of the company's early records. I have been able to locate some support for this comment.

The auditor's certification to the financial statements in the Twin City Rapid Transit Company 1943 Annual Report first contained the comment that "accounting records are not available for the period prior to January 1,1900, and for the period January 1, 1900 to December 31, 1903, are incomplete".

The Construction Journal 1901-1906 volume has the first page blank except for a notation dated February, 1902, that "entries for years 1901 and 1902 journalized from Improvement sheets which accounts for scarcity of detail".

An entry in this same Journal dated December 31, 1901, lists a credit to "Storehouse" in the amount of $10,346.03 with no explanation. Insurance recovery for the fire damage?

STREET RAILWAY JOURNAL DIRECTORIES

TRACK DETAILS

October 1888

Minneapolis St. Ry:
69.5 miles of track. 27#, 35#, and 45# rail.

St.Paul City Ry.:
66.00 miles of horsecar track. 45# and 52# rail.
4.66 miles of cablecar track. 54# Providence rail. One 600 h.p. engine.

March 1891

St.Paul City Ry.
15 miles of cablecar track + 75 miles of electric car track = 90 miles total track.
54# and 60# Johnson girder rail and T rail.

April 1891

Minneapolis St. Ry.
79 miles of electric car track + 22 miles of horsecar track = 101 miles total track.
45# and 78# Johnson rail.

1897 STRY JOURNAL

SPCR DIRECTORY 4-96

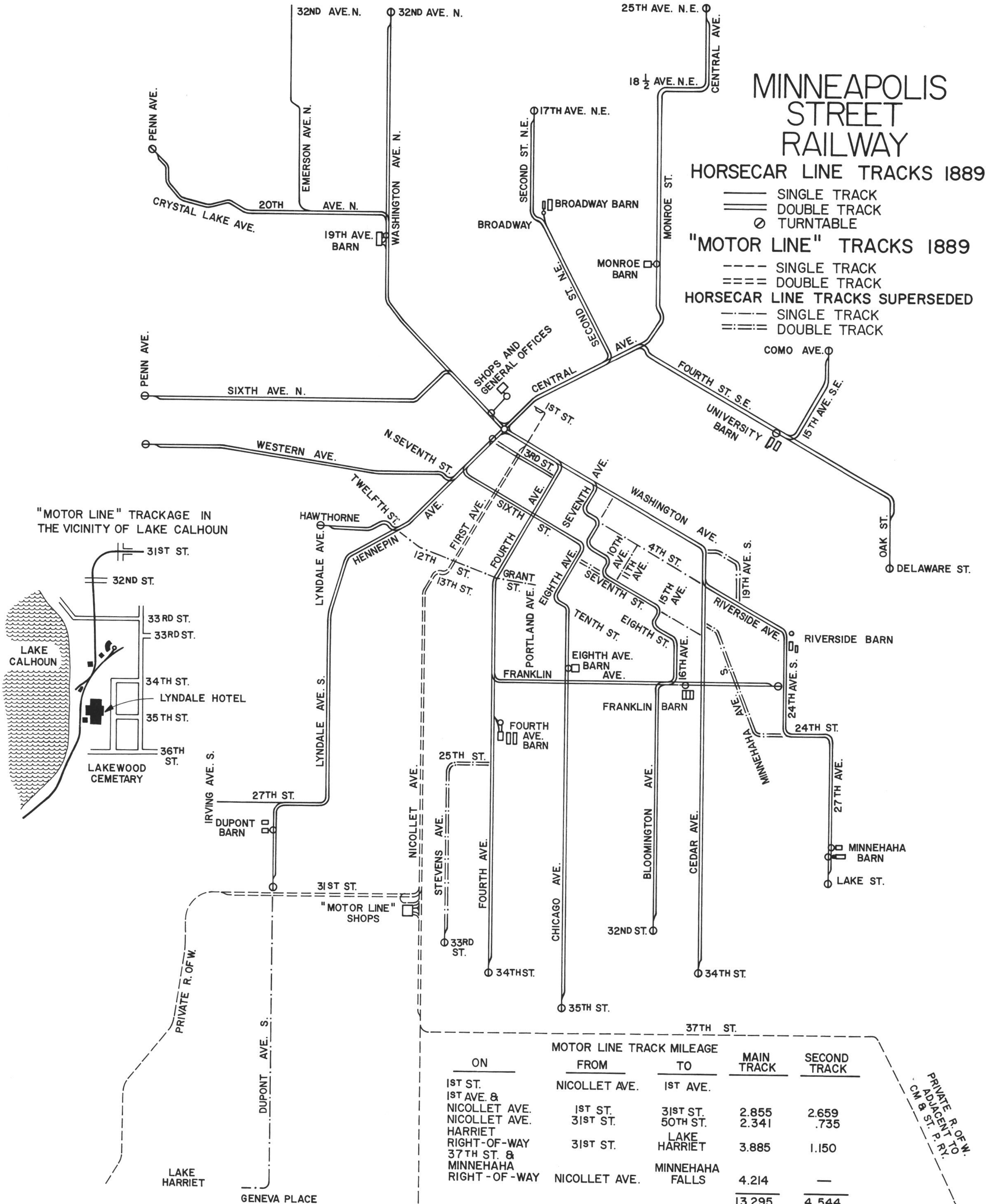
CABLE	5.874	TRACK MILES
ELECTRIC	93.632	"
TOTAL	99.506	"

THE BOND RECORD 12-31-1894

SPCR CABLE	6.263	TRACK MILES

MINNEAPOLIS HORSECAR TRACKS

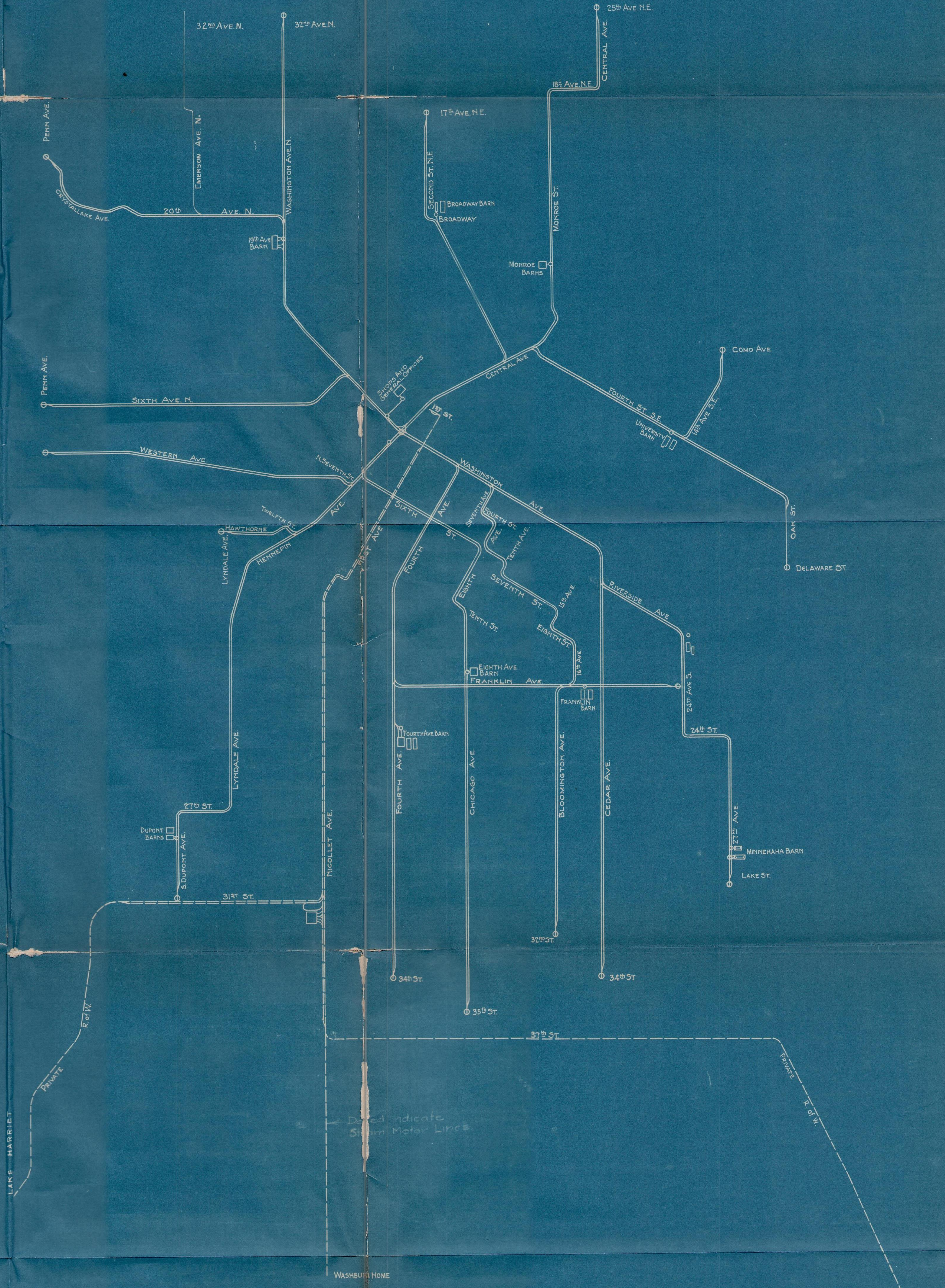
MINNEAPOLIS STREET RAILWAY


HORSECAR LINE TRACKS 1889
SINGLE TRACK
DOUBLE TRACK
TURNTABLE
"MOTOR LINE" TRACKS 1889
SINGLE TRACK
DOUBLE TRACK
HORSECAR LINE TRACKS SUPERSEDED
SINGLE TRACK
DOUBLE TRACK
32ND AVE. N.
32ND AVE. N.
25TH AVE. N.E.
CENTRAL AVE.
18 1/2 AVE. N.E.
17TH AVE. N.E.
PENN AVE.
EMERSON AVE. N.
WASHINGTON AVE. N.
SECOND ST. N.E.
BROADWAY BARN
MONROE ST.
CRYSTAL LAKE AVE.
20TH AVE. N.
19TH AVE. BARN
BROADWAY
MONROE BARN
SECOND ST. N.E.
CENTRAL AVE.
PENN AVE.
SHOPS AND GENERAL OFFICES
COMO AVE.
FOURTH ST. S.E.
15TH AVE. S.E.
SIXTH AVE. N.
UNIVERSITY BARN
1ST ST.
WESTERN AVE.
N. SEVENTH ST.
3RD ST.
WASHINGTON AVE.
OAK ST.
DELAWARE ST.
"MOTOR LINE" TRACKAGE IN THE VICINITY OF LAKE CALHOUN
TWELFTH ST.
HENNEPIN AVE.
HAWTHORNE
FIRST AVE.
SIXTH ST.
FOURTH AVE.
SEVENTH AVE.
10TH AVE.
11TH AVE.
4TH ST.
19TH AVE. S.
12TH ST.
13TH ST.
GRANT ST.
EIGHTH AVE.
SEVENTH ST.
15TH AVE.
RIVERSIDE AVE.
31ST ST.
32ND ST.
33RD ST.
33RD ST.
LAKE CALHOUN
LYNDALE AVE.
TENTH ST.
EIGHTH ST.
RIVERSIDE BARN
PORTLAND AVE.
EIGHTH AVE. BARN
16TH AVE.
S.
34TH ST.
LYNDALE HOTEL
35TH ST.
FRANKLIN AVE.
24TH AVE. S.
FRANKLIN BARN
36TH ST.
LAKEWOOD CEMETARY
LYNDALE AVE. S.
FOURTH AVE. BARN
24TH ST.
MINNEHAHA AVE.
25TH ST.
27TH AVE.
IRVING AVE. S.
27TH ST.
DUPONT BARN
NICOLLET AVE.
STEVENS AVE.
BLOOMINGTON AVE.
CEDAR AVE.
MINNEHAHA BARN
FOURTH AVE.
LAKE ST.
CHICAGO AVE.
31ST ST.
"MOTOR LINE" SHOPS
33RD ST.
32ND ST.
PRIVATE R. OF W.
34TH ST.
34TH ST.
35TH ST.
37TH ST.
DUPONT AVE. S.
PRIVATE R. OF W. ADJACENT TO CM & ST. P. RY.
LAKE HARRIET
GENEVA PLACE (45TH ST.)

MOTOR LINE TRACK MILEAGE

ON	FROM	TO	MAIN TRACK	SECOND TRACK
1ST ST.	NICOLLET AVE.	1ST AVE.		
1ST AVE. & NICOLLET AVE.	1ST ST.	31ST ST.	2.855	2.659
NICOLLET AVE.	31ST ST.	50TH ST.	2.341	.735
HARRIET RIGHT-OF-WAY	31ST ST.	LAKE HARRIET	3.885	1.150
37TH ST. & MINNEHAHA RIGHT-OF-WAY	NICOLLET AVE.	MINNEHAHA FALLS	4.214	—
			13.295	4.544

DURING 1889 DOUBLE TRACK WAS BUILT ON 3RD ST. S. FROM 4TH AVE. S. TO HENNEPIN AVE. TRACK ON 4TH AVE. S. FROM 3RD ST. S. TO WASHINGTON AVE. WAS ABANDONED. THE "HIGH ST. LOOP" WAS ALSO BUILT AT THIS TIME (1ST AVE. S. FROM WASHINGTON AVE. TO HIGH ST., HIGH ST. FROM 1ST AVE. TO HENNEPIN AVE.) APPARENTLY REPLACING "MOTOR LINE" TRACK NORTH OF WASHINGTON AVE.


32ND AVE. N.
32ND AVE. N.
25th AVE. N.E.
CENTRAL AVE.
18½ AVE. N.E.
17th AVE. N.E.
PENN AVE.
EMERSON AVE. N.
WASHINGTON AVE. N.
SECOND ST. N.E.
BROADWAY BARN
BROADWAY
MONROE ST.
CRYSTAL LAKE AVE.
20th AVE. N.
19th AVE BARN
MONROE BARNS
COMO AVE.
CENTRAL AVE
SHOPS AND GENERAL OFFICES
PENN AVE.
SIXTH AVE. N.
1ST ST.
FOURTH ST. S.E.
UNIVERSITY BARN
14th AVE. S.E.
WESTERN AVE.
N. SEVENTH ST.
WASHINGTON AVE.
TWELFTH ST.
AVE.
SIXTH AVE.
SEVENTH AVE.
FOURTH ST.
OAK ST.
HAWTHORNE
LYNDALE AVE.
HENNEPIN
FIRST AVE
ST.
AVE.
TENTH AVE.
DELAWARE ST
FOURTH
EIGHTH
SEVENTH ST.
15th AVE.
RIVERSIDE AVE
TENTH ST.
EIGHTH ST.
16th AVE.
EIGHTH AVE. BARN
FRANKLIN AVE.
24th AVE S.
FRANKLIN BARN
FOURTH AVE. BARN
24th ST.
LYNDALE AVE.
FOURTH AVE.
CHICAGO AVE.
BLOOMINGTON AVE.
CEDAR AVE.
27th ST.
27th AVE.
DUPONT BARNS
MINNEHAHA BARN
S. DUPONT AVE.
NICOLLET AVE.
LAKE ST.
31ST ST.
32ND ST.
34th ST.
34th ST.
35th ST.
37th ST.
PRIVATE R. of W.
PRIVATE R. of W.
LAKE HARRIET
WASHBURN HOME
MINNEHAHA FALLS

Dotted indicate
Steam Motor Lines

MINNEAPOLIS STREET RAILWAY CO.

MAP OF HORSE CAR LINE TRACKS

PRIOR TO CONSTRUCTION OF ELECTRIC TRACKS IN 1890

NO SCALE
MAY 20TH 1915

A. L. DRUM & COMPANY
CONSULTING & CONSTRUCTING ENGINEERS
CHICAGO.

DRAWN BY
CHECKED BY
REVISED
CORRECT

APPROVED:-

MINNEAPOLIS ST. RY.

HORSECAR TRACK CONSTRUCTION

1875

Double track built on Washington Ave. N. from the St.Paul & Pacific Railroad crossing at 4th Ave. N. to Hennepin Ave., Hennepin Ave. to the middle of Nicollet Island; single track from this point: on Central Ave. S.E. (now E. Hennepin Ave.) to 4th St. S.E., 4th St. S.E. to 14th Ave. S.E. Opened for service September 2nd. Total track amounted to 2.10 miles.

Single track built on Washington Ave. S. from Hennepin Ave. to 7th Ave. S. (now Park Ave.), 7th Ave. S. to 4th St. S., 4th St. to Cedar Ave.

As of December 31st 4.37 miles of track were owned.

1876

On	From	To
	Single Track built	
4th Ave. S.	Washington Ave.	17th St.
Washington Ave. N.	4th Ave. N.	Plymouth Ave.
Hennepin Ave. S.	Washington Ave.	12th St.
12th St.	Hennepin Ave. S.	3rd Ave. S.
	Second Track added	
Washington Ave. S.	Hennepin Ave.	7th Ave. S.

1877

On	From	To
	Single Track built	
11th Ave. S.	4th St. S.	7th St. S.
7th St. S.	11th Ave. S.	Cedar Ave.
12th St. S.	3rd Ave. S.	4th Ave. S.
Grant St.	4th Ave. S.	Portland Ave.
	Track abandoned	
4th St. S.	11th Ave. S.	Cedar Ave.

1878

On	From	To
	Single Track built	
Washington Ave. S.	7th Ave. S.	8th Ave. S.
8th Ave. S.	Washington Ave.	7th St. S.
7th St. S.	8th Ave. S.	11th Ave. S.
15th Ave. S.	7th St. S.	8th St. S.
8th St. S.	15th Ave. S.	16th Ave. S.
16th Ave. S.	8th St. S.	Franklin Ave.
4th Ave. S.	17th St.	24th St. S.

1878 continued

	Single track built	
	The 1-1-1916 Valuation also lists:	
7th St. S.	15th Ave. S.	Cedar Ave.
Cedar Ave.	7th St. S.	Franklin Ave.
	Track abandoned	
11th Ave. S.	4th St. S.	7th St. S.
4th St. S.	8th Ave. S.	11th Ave. S.

1879

On	From	To
	Track abandoned June 23rd	
12th St. S.	Hennepin Ave. S.	4th Ave. S.
Grant St.	4th Ave. S.	Portland Ave.

1880

On	From	To
	Single Track built-completed April 27th	
Washington Ave. S.	8th Ave. S.	19th Ave. S.
19th Ave. S.	Washington Ave. S.	Riverside Ave. S.
Riverside Ave. S.	19th Ave. S.	25th Ave. S.
	Single Track built	
12th St. N.	Hennepin Ave.	Hawthorne Ave.
Hawthorne Ave.	12th St. N.	Lyndale Ave. N.
	Track abandoned November 18th	
7th St. S.	15th Ave. S.	Cedar Ave.
	The 1-1-1916 Valuation also lists:	
Cedar Ave.	7th St. S.	Franklin Ave.

1881

On	From	To
	Single Track built	
Franklin Ave.	16th Ave. S.	Cedar Ave.
Cedar Ave.	Franklin Ave.	Lake St.
8th Ave. S.	7th St. S.	Franklin Ave. JUNE 3RD
	Single Track built-completed April 18th	
7th St. N.	Hennepin Ave.	Western Ave. N.
Western Ave. N.	7th St. N.	GN Ry./M&StL Ry. tracks
	Double track built	
2nd St. N.E.	Hennepin Ave. E.	Broadway St. N.E.
	Second track added	
4th Ave. S.	Washington Ave.	24th St.
Hennepin Ave. E.	middle of Nicollet Island	4th St. S.E.
4th St. S.E.	Hennepin Ave. E.	14th Ave. S.E.

1882

On	From	To
	Double Track built	
Washington Ave. N.	Plymouth Ave.	20th Ave. N. (Broadway)
	Single Track built	
20th Ave. N.	Washington Ave. N.	Fremont Ave. N.
	Double Track built	
6th St. S.	Hennepin Ave. S.	8th Ave. S.
Central Ave.(E. Hennepin)	4th St. S.E.	Monroe St. N.E.
Monroe St. N.E.	Central Ave. N.E.	Broadway St. N.E.
	Single Track built	
Monroe St. N.E.	Broadway St. N.E.	18½ Ave. N.E.
18½ Ave. N.E.	Monroe St. N.E.	Central Ave. N.E.
Central Ave. N.E.	18½ Ave. N.E.	25th Ave. N.E.
	Second Track added	
7th Ave. S.	Washington Ave. S.	4th St. S.
4th St. S.	7th Ave. S.	8th Ave. S.
8th Ave. S.	4th St. S.	7th St. S.
7th St. S.	8th Ave. S.	15th Ave. S.
15th Ave. S.	7th St. S.	8th St. S.
8th St. S.	15th Ave. S.	16th Ave. S.
16th Ave. S.	8th St. S.	Franklin Ave.
Hennepin Ave. S.	Washington Ave.	12th St.
12th St. N.	Hennepin Ave. S.	Hawthorne Ave. N.
Hawthorne Ave. N.	12th St. N.	Lyndale Ave. N.
Washington Ave. S.	4th Ave. S.	19th Ave. S.
19th Ave. S.	Washington Ave.	Riverside Ave. S.
Riverside Ave. S.	19th Ave. S.	25th Ave. S.
Washington Ave. N.	4th Ave. N.	Plymouth Ave. N.

1883

On	From	To
	Single Track built	
20th Ave. N.	Fremont Ave. N.	Crystal Lake Ave.
Crystal Lake Ave.	20th Ave. N.	Knox Ave. N.
4th Ave. S.	24th St. E.	25th St. E.
25th St. E.	4th Ave. S.	Stevens Ave. S.
Stevens Ave. S.	25th St. E.	Lake St. E.

(According to the 1-1-1916 Valuation there was single track on 25th St. and double track on Stevens Ave. See 1884.)

1884

On	From	To
	Double Track built	
Hennepin Ave. S.	12th St.	Lyndale Ave. S.
Lyndale Ave. S.	Hennepin Ave. S.	27th St. W.
27th St. W.	Lyndale Ave. S.	Dupont Ave. S.
Dupont Ave. S.	27th St. W.	29th St. W.

1884 continued

On	From	To
	Single Track built	
Dupont Ave. S.	29th St. W.	Geneva Place (45th St.)
Geneva Place (45th St.)	Dupont Ave. S.	Lake Harriet
	Double Track built	
Cedar Ave. S.	Washington Ave. S.	Minnehaha Ave. S.
Minnehaha Ave. S.	Cedar Ave. S.	24th St. E.
24th St. E.	Minnehaha Ave. S.	27th Ave. S.
27th Ave. S.	24th St. E.	27th St. E.
Riverside Ave. S.	Cedar Ave. S.	19th Ave. S.
Stevens Ave. S.	Lake St. E.	33rd St. E.
	Second Track added	
Monroe St. N.E.	Broadway St. N.E.	18½ Ave. N.E.
18½ Ave. N.E.	Monroe St. N.E.	Central Ave. N.E.
Central Ave. N.E.	18½ Ave. N.E.	25th Ave. N.E.
8th Ave. S.	7th St. S.	Franklin Ave.
4th Ave. S.	24th St. E.	25th St. E.
25th St. E.	4th Ave. S.	Stevens Ave. S.
Stevens Ave. S.	25th St. E.	Lake St. E.
	Track abandoned	
Washington Ave. S.	Cedar Ave. S.	19th Ave. S.
19th Ave. S.	Washington Ave. S.	Riverside Ave. S.
8th Ave. S.	Washington Ave. S.	4th St. S.

1885

On	From	To
	Single Track built	
3rd Ave. N.	Washington Ave. N.	2nd St. N.
	Double Track built	
6th Ave. N.	Washington Ave. N.	Girard Ave. N.
Franklin Ave.	16th Ave. S.	Bloomington Ave. S.
Bloomington Ave. S.	Franklin Ave.	26th St. E.
Western Ave. N.	Railroad tracks	Girard Ave. N.
	Second Track added	
7th St. N.	Hennepin Ave. S.	Western Ave. N.
Western Ave. N.	7th St. N.	Railroad tracks

1886

On	From	To
	Double Track built	
Cedar Ave. S.	Minnehaha Ave. S.	Franklin Ave.
Bloomington Ave. S.	26th St. E.	29th St. E.
8th Ave. S.	Franklin Ave.	Lake St. E.
Washington Ave. N.	20th Ave. N.	32nd Ave. N.
4th St. S.E.	14th Ave. S.E.	15th Ave. S.E.
15th Ave. S.E.	4th St. S.E.	Como Ave.
27th Ave. S.	27th St. E.	Lake St. E.
24th Ave. S.	Riverside Ave. S.	24th St. E.

1886 continued

On	From	To
	Second Track added	
20th Ave. N.	Washington Ave. N.	Knox Ave. N.
Cedar Ave.	Franklin Ave.	Lake St. E.
	Track abandoned	
Riverside Ave. S.	24th Ave. S.	25th Ave. S.
Minnehaha Ave. S.	Cedar Ave. S.	24th St. E.
24th St. E.	Minnehaha Ave. S.	24th Ave. S.

(The 1-1-1916 Valuation lists track on Franklin Ave. from 16th Ave. S. to Cedar Ave. S. as also being abandoned.)

1887

On	From	To
	Double Track built	
Crystal Lake Ave.	Knox Ave. N.	Penn Ave. N.
4th St. S.E.	15th Ave. S.E.	Oak St. S.E.
	Single Track built	
Oak St. S.E.	4th St. S.E.	Delaware Ave. S.E.
	Double Track built	
6th St. S.	8th Ave. S.	10th Ave. S.
10th Ave. S.	6th St. S.	7th St. S.
4th Ave. S.	25th St. E.	34th St. E.
	Single Track built	
27th St. W.	Dupont Ave. S.	Irving Ave. S.
	Track abandoned	
7th St. S.	8th Ave. S.	10th Ave. S.
25th St. E.	4th Ave. S.	Stevens Ave. S.
Stevens Ave. S.	25th St. E.	33rd St. E.
Dupont Ave. S.	31st St. W.	Geneva Place
Geneva Place	Dupont Ave. S.	Lake Harriet

1888

On	From	To
	Double Track built	
Bloomington Ave. S.	29th St. E.	32nd St. E.
Cedar Ave. S.	Lake St. E.	34th St. E.
8th Ave. S.	Lake St. E.	35th St. E.
Franklin Ave.	4th Ave. S.	24th Ave. S.
2nd St. N.E.	Broadway St. N.E.	17th Ave. N.E.
6th Ave. N.	Girard Ave. N.	Penn Ave. N.
Western Ave. N.	Girard Ave. N.	Penn Ave. N.

A directory for this period reported that 186 horsecars were operated over 69.3 miles of 3'6" gauge track.

Franklin Ave.
horsecar line
ceased operating
10-26-1889

1889

On	From	To
Double Track built		
3rd St. S.	4th Ave. S.	Hennepin Ave. S.
Double Track built using track materials from the proposed cablecar line		
Grant St.	Nicollet Ave. S.	1st Ave. S.
1st Ave. S.	Grant St.	13th St.
Single Track built-High St. loop		
1st Ave. S.	Washington Ave.S.	High St.
High St.	1st Ave. S.	Hennepin Ave. S.
Single Track built		
Emerson Ave. N.	20th Ave. N.	32nd Ave. N.(Lowry Ave.)
Track abandoned		
Nicollet Ave.	13th St.	Grant St.
13th St.	Nicollet Ave.	1st Ave. S.
4th Ave. S.	3rd St. S.	Washington Ave. S.

HORSECAR TURNTABLE LOCATIONS

As of 1889

Bloomington Ave. and 32nd St
Cedar Ave. and 34th St.
8th Ave. S. and 35th St.
Central Ave. N.E. and 25th Ave. N.E.
14th Ave. S.E. and Como Ave.
Dupont Ave. S. and 31st St.
Franklin Ave. and 24th Ave. S.
Hawthorne Ave. N. and Lyndale Ave. N.
Washington Ave. and Hennepin Ave.
3rd St. S. and Hennepin Ave. S.
27th Ave. S. and Lake St.
Oak St. S.E. and Delaware Ave. S.E.
3rd Ave. N. and Washington Ave. N.
Washington Ave. N. and 32nd Ave. N.
Western Ave. N. and Penn Ave. N.
2nd St. N.E. and 17th Ave. N.E.
4th Ave. S. and 34th St.
6th Ave. N. and Penn Ave. N.
20th Ave. N. and Penn Ave. N.

HORSECAR TRACK MILEAGE

According to the 1-1-1916 Valuation Report, just prior to the initial electrification in 1889, 66.659 miles of horsecar track was owned. Previously 9.289 miles of track had been abandoned prior to the expiration of its useful life.

Based on the construction dates and track measurements given in the A. L. Drum & Company Valuation Report the following table was prepared. The figures **include** horsecar barn trackage.

Year	Built	Aband.	Total
1875	4.568		4.568
1876	3.422		7.990
1877	1.051	.426	8.615
1878	2.161	.466	10.310
1879		.771	9.539
1880	2.023	.483	11.079
1881	7.399	.112	18.366
1882	11.326		29.692
1883	1.259		30.951
1884	14.128	.913	44.166
1885	5.294		49.460
1886	9.943	1.811	57.592
1887	4.976	4.419	58.149
1888	9.492		67.641
1889	1.636	.155	69.122

MINNEAPOLIS STREET RAILWAY
HORSECAR TRACK CONSTRUCTION
Compiled from Minneapolis Tribune articles

7-10-1875: [Reported on the election of company officers 7-9-1875 which agrees with previous history. The board of directors was reported as: Philo Osgood, Amos Prescott, F. C. Shephard, James Tuckerman, Thomas Lowry, and Charles Hathaway.] Charles Hathaway is one of the oldest and most experienced street railway builders in the United States. He is the builder of the line in operation in St.Paul.

7-28-1875: The old track on Third Street is being torn up preparatory to its removal to the recently established routes of the line.

9-14-1875: The New Suspension Bridge; The Street Railway. Two tracks for the horse railway will be laid on the bridge and it is the determination of the engineer to have them so constructed that they will not interfere with the convenience of travel or the safety of vehicles.The idea is to lay one rail of iron with a tread five or six inches wide and the other rail to use an oak plank with a strap iron facing. The width of the track is only three feet, six inches, much narrower than any pleasure or business vehicle. Outside of this strap iron rail will be laid a second rail with a broad tread, just like the first one named. The distance between the flanges of the two outside rails will be five feet, five inches, which will admit of the free passage of the widest carts. This arrangement, it is expected, will do away with the straining of wheels and springing of axles which is the serious objection to street railway tracks, and in addition to this, offers a smooth iron surface on which the wheels will roll easily and smoothly. The space between the rails will be filled with blocks of wood on end, similar to the Nicholson pavement, affording a fine and pleasant footing for horses.

5-23-1876: The turntable at the corner of Central Avenue and 3rd Street has been removed.

5-26-1876: Work has started on the turntable to be located at the Washington and Hennepin Avenues junction.

7-7-1876: New siding built on 14th Ave. S. and 7th St. E.

1-2-1877: 8 miles of track.

5-1-1877: Changed the siding on 12th St. from 2nd Ave. S. to between Nicollet and 1st Ave. S. "and now make splendid time on that route".

3-11-1878: 8 miles of road; the company has not extended their lines during the previous year.

9-18-1878: The siding on Nicollet Island will be relocated from the center to a point between the anchorages and the east end of the suspension bridge.

11-5-1878: See the article "The Street Railway" in Notebook 2A for some general information on work done during the year.

10-11-1879: Interview with Supt. Atwood (see Horsecar Lines from Mpls. Tribune Articles): 9 miles of road to which may be added 1 1/4 miles of second track and several sidings for a total of 11 miles of track.

12-17-1880: 13 miles of street railway are operated.

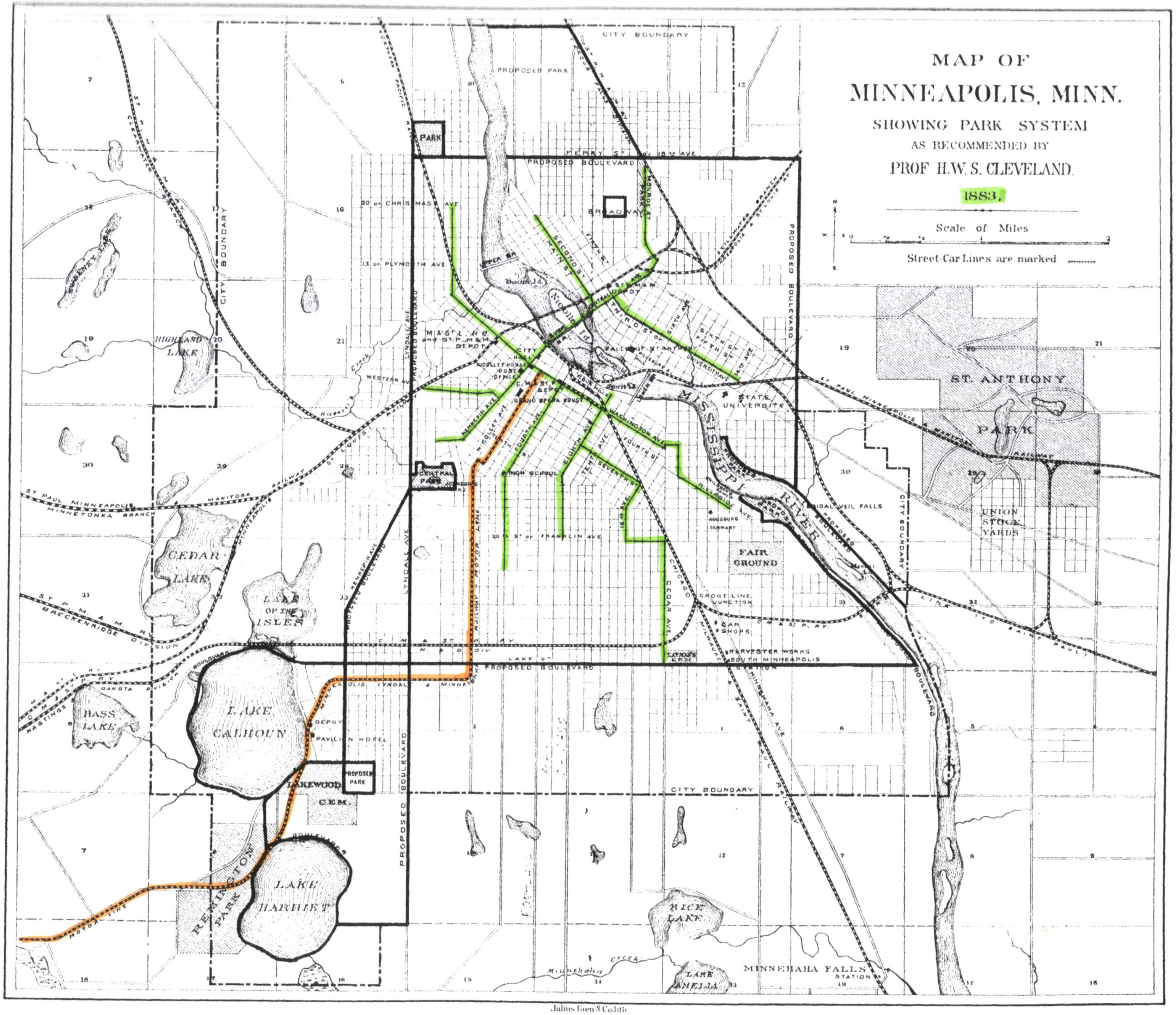
8-29-1890: U. S. Census Bulletin:	1880	1890
Minneapolis: Miles of Road	9	51.50
St.Paul: Miles of Road	6	32

MSR TRACK CONSTRUCTION
Compiled from Street Railway Journal articles

June 1886: MSR is putting in several of William Wharton & Co.'s turntables and automatic switches.

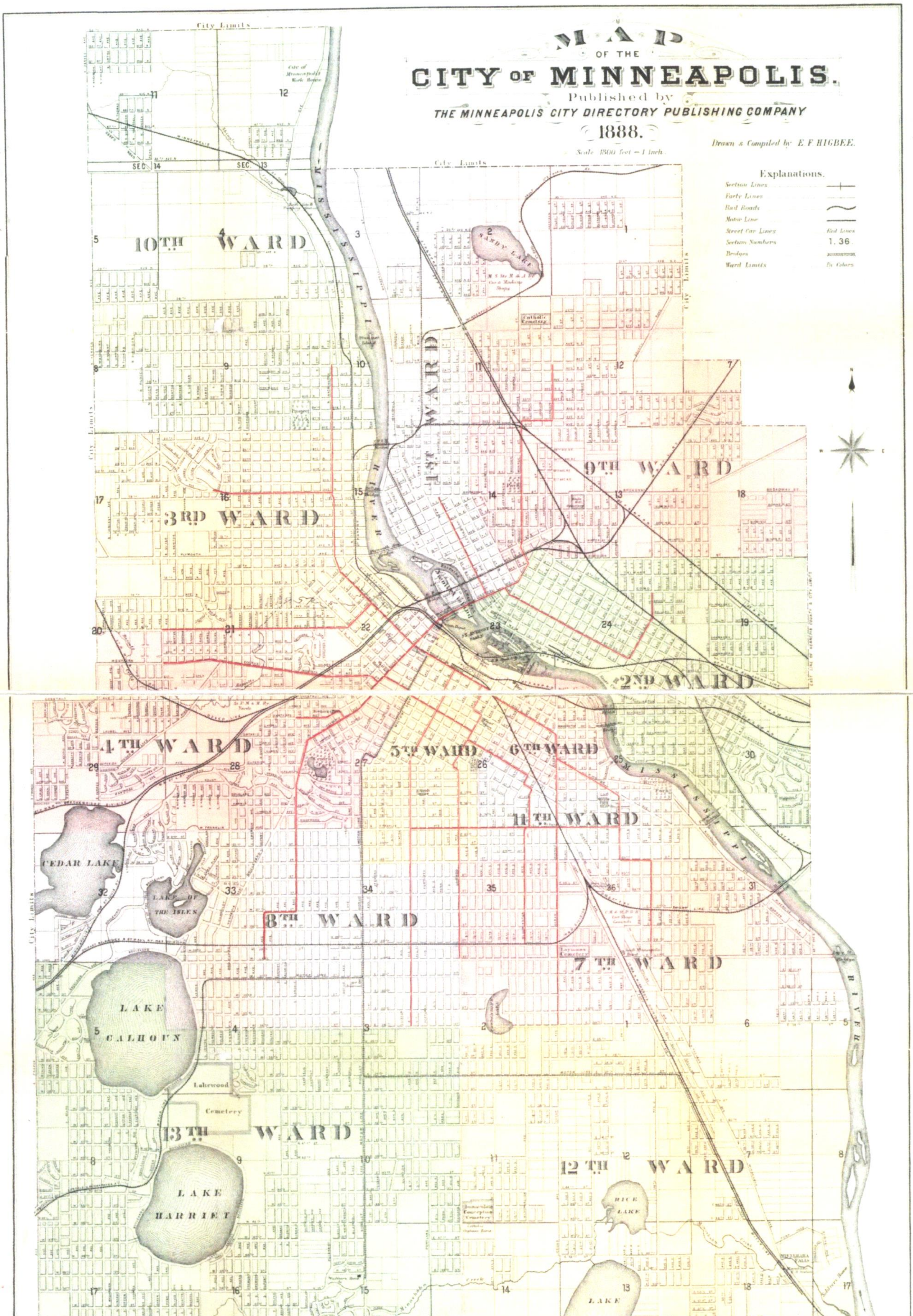
June 1888: The motor line has laid a second track between Lakes Calhoun and Harriet.

November 1889: Work was begun October 1st on the new electric road being built on the Fourth Avenue line in Minneapolis. This road will be equipped with the Thomson-Houston system by the Northwestern Electric Construction and Supply Co. of St.Paul, who control the patents of the Thomson-Houston Co. for the Northwest. The current to operate these cars will be furnished from generators to be placed in the new powerhouse of the Northwestern Construction & Supply Co. in Minneapolis in what is known at the old Pray building. These generators are capable of giving out a current equal to 80 h.p., and are perfectly automatic in their regulation.


MAP OF
MINNEAPOLIS, MINN.
SHOWING PARK SYSTEM
AS RECOMMENDED BY
PROF H.W.S. CLEVELAND.
1883.
Scale of Miles
0
1/4
1/2
1
2
Street-Car Lines are marked
N.
W.
S.
CITY BOUNDARY
PROPOSED PARK
PARK
FERRY ST or 18th AVE
PROPOSED BOULEVARD
BROADWAY
20 or CHRISTMAS AVE
13 or PLYMOUTH AVE
UPPER BR.
Boom Id.
SECOND ST
MAIN ST
FIRST ST
MONROE ST
NICOLLET ID.
THIRD ST
FIFTH ST
SIXTH ST
UNIVERSITY AVE
4th AVE
FALLS OF ST ANTHONY
M. & ST L. R.R. and ST P. M. & M. DEPOT
CITY HALL
NICOLLET HOUSE
POST OFFICE
C. M. & ST P. R.R. DEPOT
GRAND OPERA HOUSE
WESTERN AVE
LYNDALE AVE
HENNEPIN AVE
NICOLLET AVE
FOURTH AVE
EIGHTH AVE
TENTH AVE
SEVENTH ST
FOURTH ST
WASHINGTON AVE
CEDAR AVE
CHICAGO AVE
HIGH SCHOOL
20th ST or FRANKLIN AVE
CENTRAL PARK
STATE UNIVERSITY
MISSISSIPPI RIVER
AUGSBURG SEMINARY
FAIR GROUND
BRIDAL VEIL FALLS
SHORT LINE JUNCTION
CAR SHOPS
HARVESTER WORKS SOUTH MINNEAPOLIS
LAYMAN'S CEM.
LAKE ST
ST. ANTHONY PARK
UNION STOCK YARDS
ST PAUL MINNEAPOLIS & MANITOBA RAILWAY
MINNETONKA BRANCH
ST P. M. & M. RY
BRECKENRIDGE DIVISION
HASTINGS & DAKOTA DIVISION
HIGHLAND LAKE
CEDAR LAKE
LAKE OF THE ISLES
LAKE CALHOUN
BASS LAKE
DEPOT
PAVILION HOTEL
LAKEWOOD CEM.
PROPOSED PARK
REMINGTON PARK
LAKE HARRIET
RICE LAKE
LAKE AMELIA
Minnehaha Creek
MINNEHAHA FALLS STATION
MINNEHAHA AVE
MOTOR LINE
CHICAGO MILWAUKEE & ST PAUL RAILWAY
BOULEVARD
CITY BOUNDARY

Julius Bien & Co. lith

G 4144 .M5 1888 .H54x



MAP OF THE CITY OF MINNEAPOLIS.

Published by
THE MINNEAPOLIS CITY DIRECTORY PUBLISHING COMPANY
1888.

Scale 1800 feet = 1 inch.

Drawn & Compiled by E. F. HIGBEE.

Explanations.
Section Lines
Forty Lines
Rail Roads
Motor Line
Street Car Lines — Red Lines
Section Numbers — 1. 36
Bridges
Ward Limits — By Colors
City Limits
10TH WARD
3RD WARD
1ST WARD
9TH WARD
2ND WARD
4TH WARD
5TH WARD
6TH WARD
11TH WARD
8TH WARD
7TH WARD
13TH WARD
12TH WARD
MISSISSIPPI RIVER
SANDY LAKE
CEDAR LAKE
LAKE OF THE ISLES
LAKE CALHOUN
LAKE HARRIET
RICE LAKE
LAKE AMELIA
Lakewood Cemetery
Catholic Cemetery
MINNEHAHA FALLS
SEC. 14
SEC. 13

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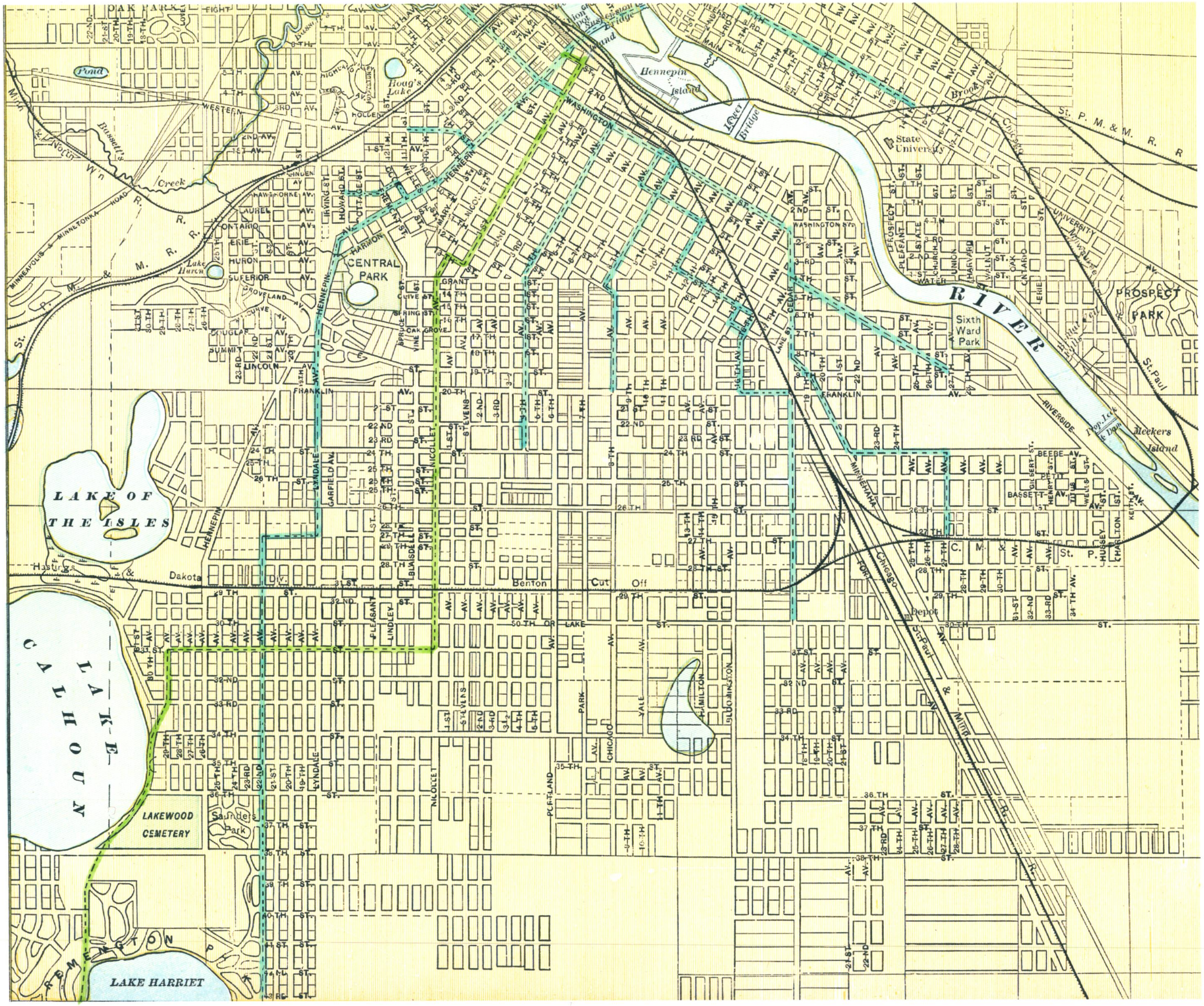
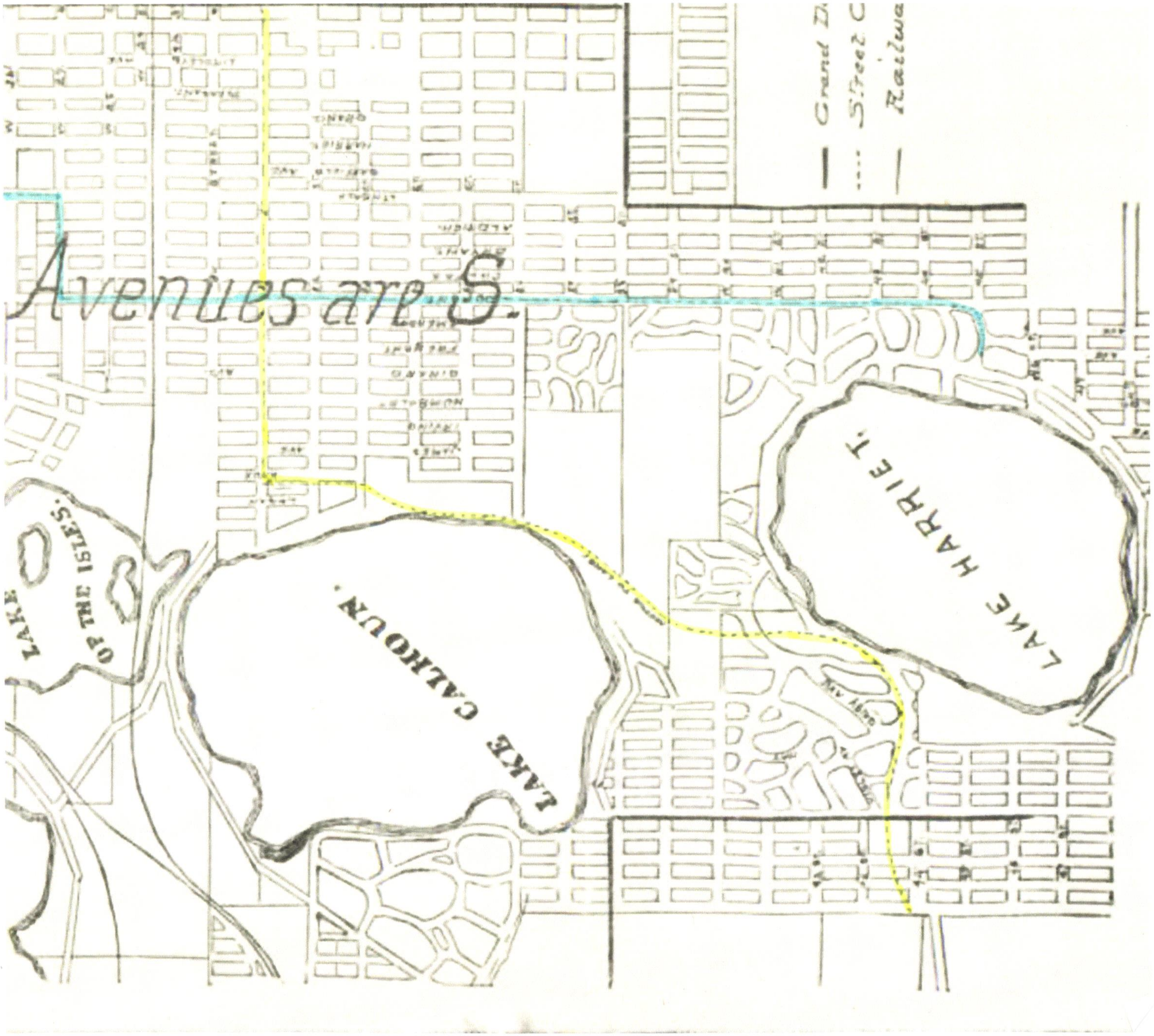
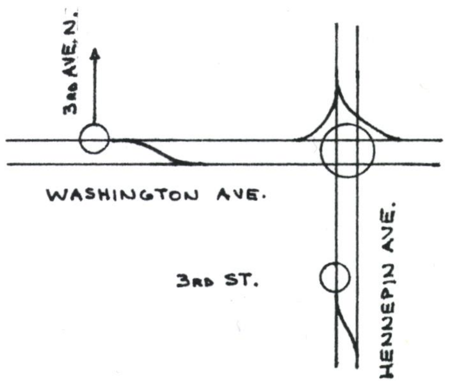
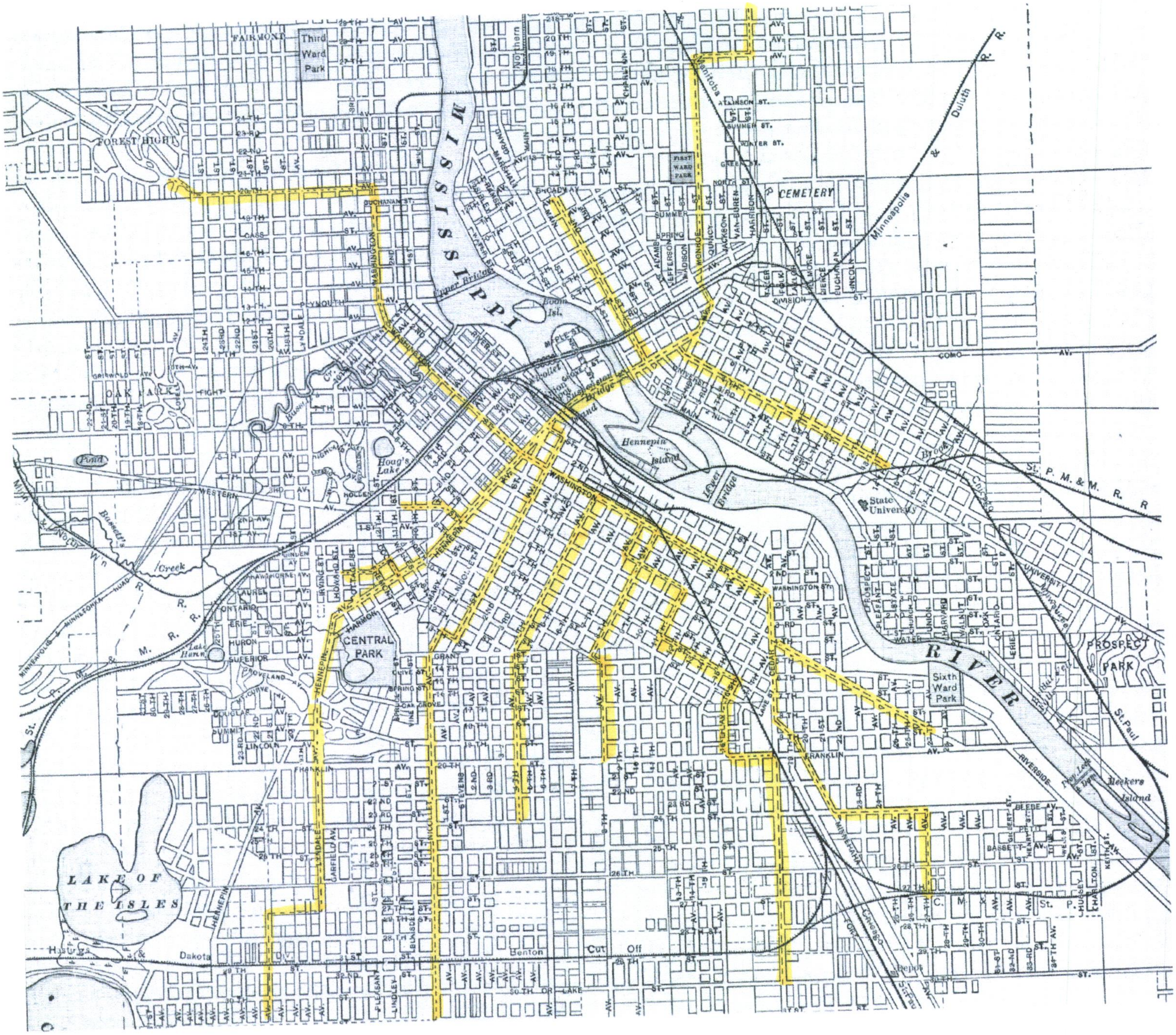
BASICS
40135


LAKE OF THE ISLES
LAKE CALHOUN
LAKE HARRIET
LAKEWOOD CEMETERY
Saunders Park
REMINGTON PK
CENTRAL PARK
Loring Lake
Lake Huron
Pond
Hoag's Lake
Bassett's Creek
Hennepin Island
Nicollet Island
Suspension Bridge
Lower Bridge
State University
RIVER
PROSPECT PARK
Sixth Ward Park
Meekers Island
Prop. Lock & Dam
Hastings & Dakota Div.
Benton Cut Off
St. P. M. & M. R. R
C. M. & St. P.
Minneapolis & Minnetonka Road
Minn. & North W'n R. R.
Depot
HENNEPIN
NICOLLET
WASHINGTON
FRANKLIN
RIVERSIDE
MINNEHAHA
CEDAR
LYNDALE
UNIVERSITY
BLOOMINGTON
CHICAGO
PORTLAND
WESTERN
LAKE ST.

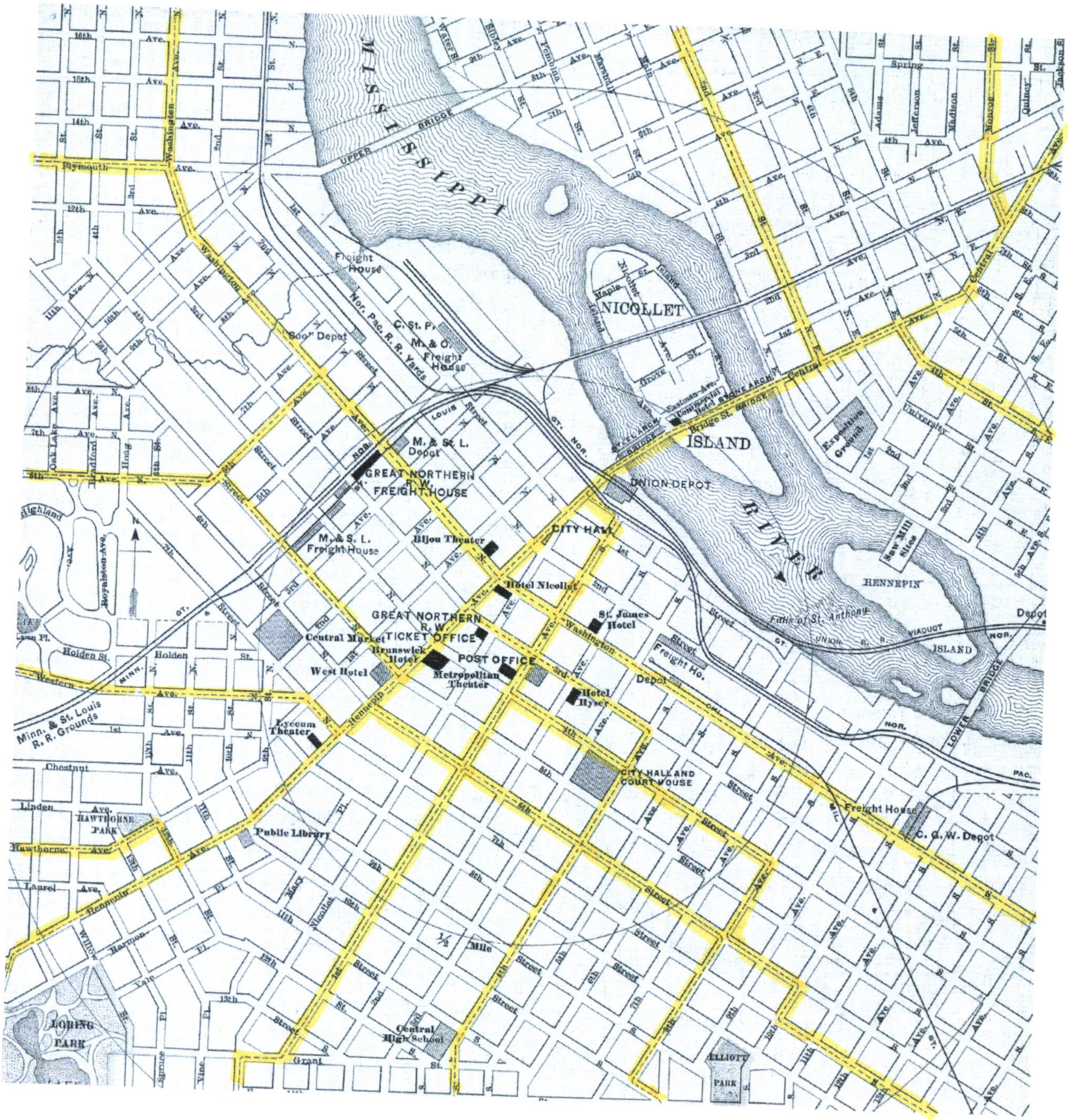

Avenues are S.
LAKE OF THE ISLES.
LAKE CALHOUN.
LAKE HARRIET.
Grand D
Street C
Railwa

INTERSECTION DETAIL


3RD AVE. N.
WASHINGTON AVE.
3RD ST.
HENNEPIN AVE.


FAIRMONT
Third Ward Park
FOREST HIGHT
OAK PARK
MISSISSIPPI
RIVER
Upper Bridge
Boom Isl.
Hennepin Island
Lower Bridge
FIRST WARD PARK
CEMETERY
Minneapolis & Duluth R. R.
St. P. M. & M. R. R.
State University
PROSPECT PARK
Sixth Ward Park
Beckers Island
CENTRAL PARK
Hoag's Lake
Pond
Bassett's Creek
LAKE OF THE ISLES
Lake Henn
WASHINGTON
HENNEPIN
NICOLLET
LYNDALE
FRANKLIN
RIVERSIDE
UNIVERSITY
COMO
Benton Cut Off
Dakota
C. M. & St. P.
Depot

AVERY® PV119ED


MISSISSIPPI
RIVER
UPPER BRIDGE
NICOLLET
ISLAND
HENNEPIN
ISLAND
Falls of St. Anthony
LOWER BRIDGE
Freight House
Nor. Pac. R.R. Yards
C. St. P. M. & O. Freight House
"Soo" Depot
M. & St. L. Depot
GREAT NORTHERN R.W. FREIGHT HOUSE
M. & St. L. Freight House
UNION DEPOT
Bijou Theater
CITY HALL
Hotel Nicollet
St. James Hotel
GREAT NORTHERN R.W. TICKET OFFICE
Central Market
Brunswick Hotel
POST OFFICE
West Hotel
Metropolitan Theater
Hotel Hyser
Lyceum Theater
Freight Ho.
Depot
CITY HALL AND COURT HOUSE
Freight House
C. G. W. Depot
Public Library
Exposition Ground
Saw Mill Sites
Central High School
HAWTHORNE PARK
LORING PARK
ELLIOTT PARK
Minn. & St. Louis R.R. Grounds
1/2 Mile
Washington Ave.
Hennepin Ave.
Nicollet Ave.
Plymouth Ave.
Western Ave.
Hawthorne Ave.
Highland
Central Ave.
University Ave.
Grant St.
Depot

A HISTORY OF THE
MINNEAPOLIS STREET RAILWAY COMPANY
Covering 35 Years---1873-1908

"Being a Series of 27 Page Advertisments Published in the Minneapolis Daily Papers During the Months of January and February, 1909."

The Minneapolis Public Library, Minneapolis History Collection, possesses a copy of this publication. According to this publication the conversion of the track gauge from 3'6" to 4'8½" was begun in 1888 and continued for fifteen months until completion in 1890. Other sources indicate that the conversion was accomplished simultaneously with electrification of the system.

During conversion of the system during 1890 and 1891 from horse-drawn cars to electrically operated streetcars the tracks of some horsecar lines were moved to the side of the street during the conversion process. On other lines temporary horsecar tracks were installed on adjacent streets during the interim. ~~The foregoing referenced publication contains a listing of all these streets~~.

HORSECAR TRACK CONSTRUCTION SPECIFICATIONS

The track of the first horsecar line was laid to 3'6" gauge on the surface of unpaved streets. 5"x5"x16'0" wood stringers were drift-bolted to 5"x5"x5'0" wood crossties. Twenty-three pounds per yard bent iron plates, which formed the running surface for the car wheels, were spiked to the wood stringers. Contract cost of the completed track was $6,000 per mile.

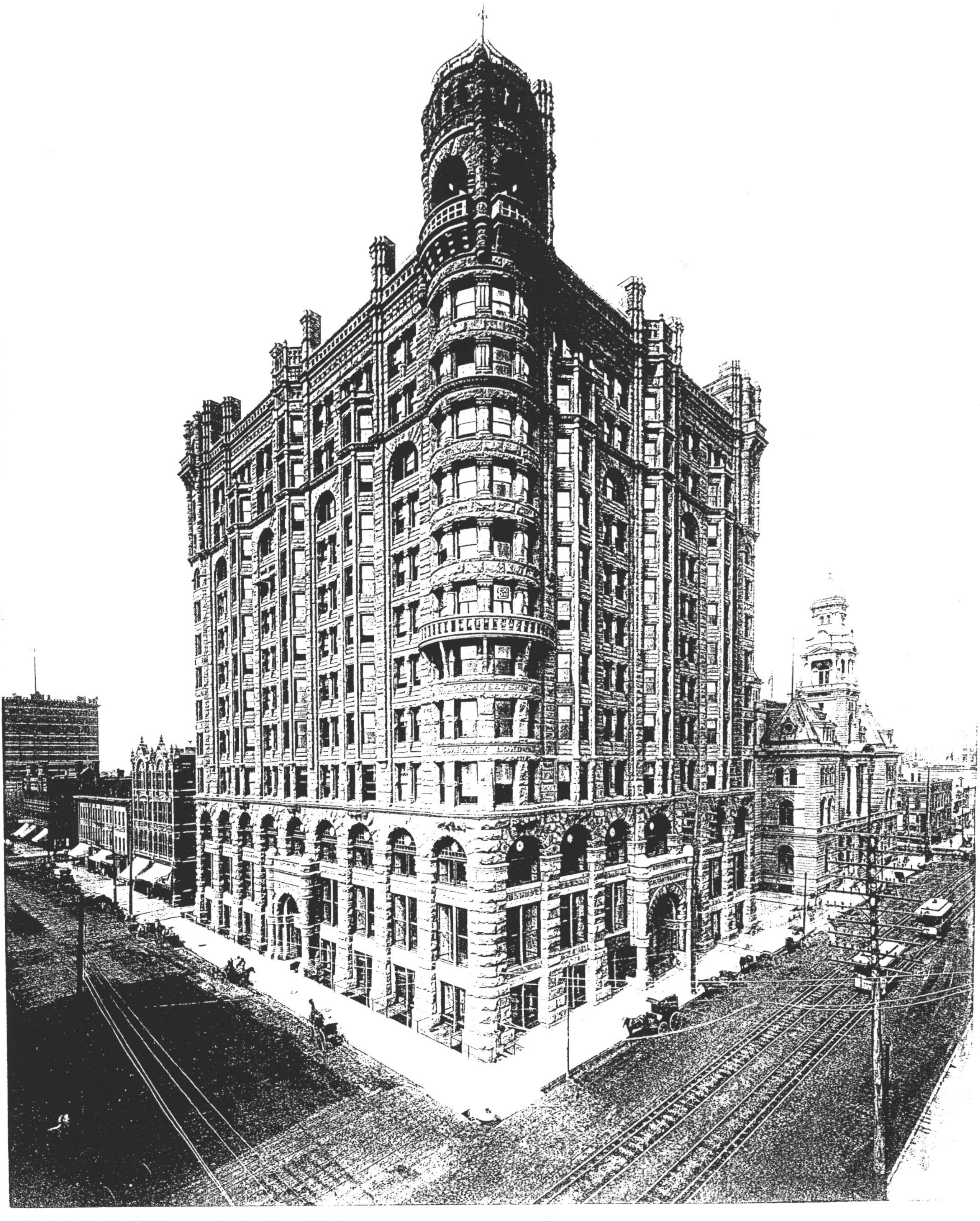
The second type of track construction used, beginning about 1878, consisted of 4"x5" wood stringers spiked to 4"x5"x5'0" wood crossties, with the stringers braced on the crossties by wood chairs. 25 lbs/yd iron strap rail was spiked (square spikes) to the stringers.

The 1-1-1916 Valuation combines these first two categories into one. 26 lb/yd to 35 lb/yd strap rail in 30'0" lengths, 5"x5" wood stringers, 5"x5"x5'0" wood crossties on 5'0" centers. Direct cost $6,639 per mile.

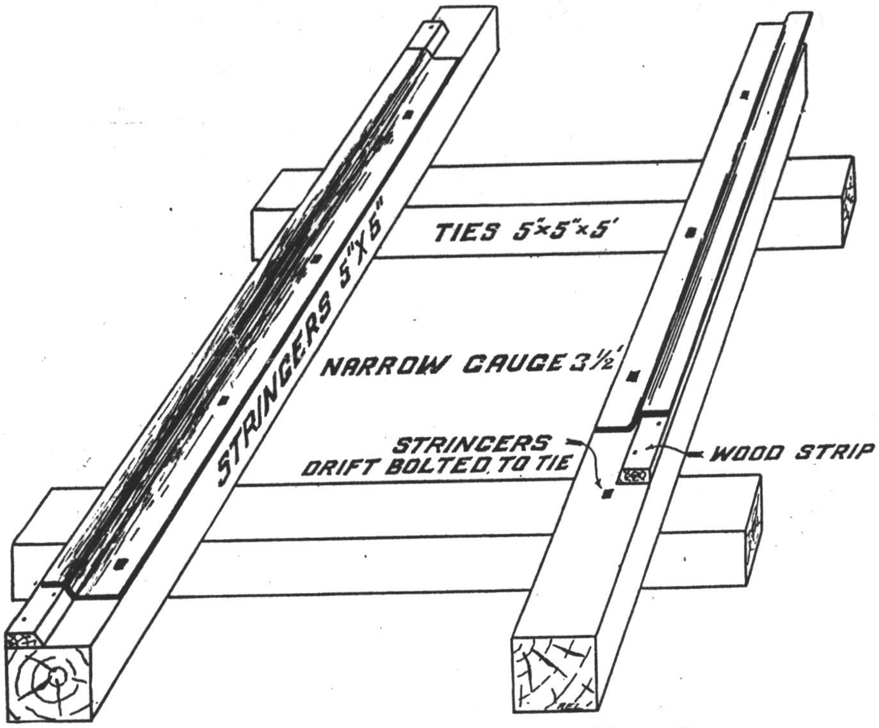
Beginning about 1880 45 lb/yd girder rail was used spiked to 8"x8"x5'0" wood crossties on 3'0" centers. When street paving, cedar blocks laid on pine planks, was undertaken about 1885 the 45 lb/yd girder rail was supported on steel chairs to provide the needed depth. The 1-1-1916 Valuation describes these two categories. 4¼" 45 lb/yd girder rail (45-119), plate joints, 6"x6"x5'0" wood crossties on 3'0" centers; direct cost $7,759 per mile. Same rail, set on 3" steel chairs, 6"x8"x5'0" wood crossties; direct cost $9,418 per mile.

Summarized from the 1-1-1916 Valuation Report

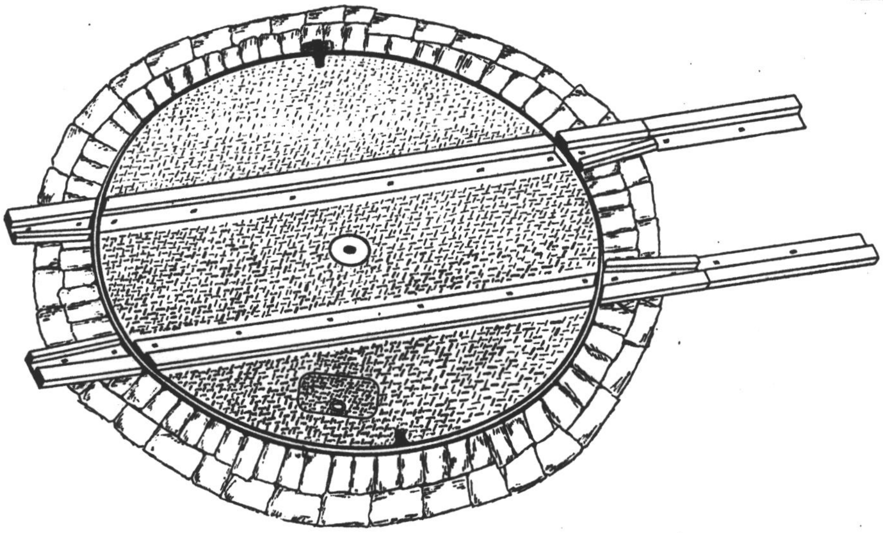
Construction	Abandoned due to Development	Superseded	Total
26#-35# Strap Rail	6.225 miles	24.286 miles	30.511 miles
4¼ 45# Girder Rail	3.064 miles	41.925 miles	44.989 miles
52# Girder Rail		.447 miles	.447 miles
Totals	9.289 miles	66.658 miles	75.947 miles
	===========	============	============



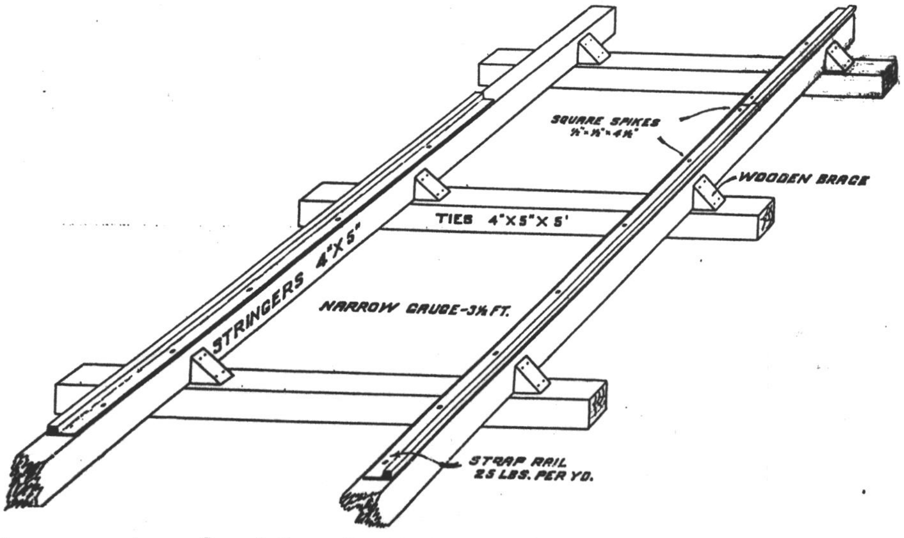
Horsecar track and electric track -
three rail new construction


TIES 5"×5"×5'
STRINGERS 5"X5"
NARROW GAUGE 3½'
STRINGERS DRIFT BOLTED TO TIE
WOOD STRIP

First Street Car Track Construction in Minneapolis.

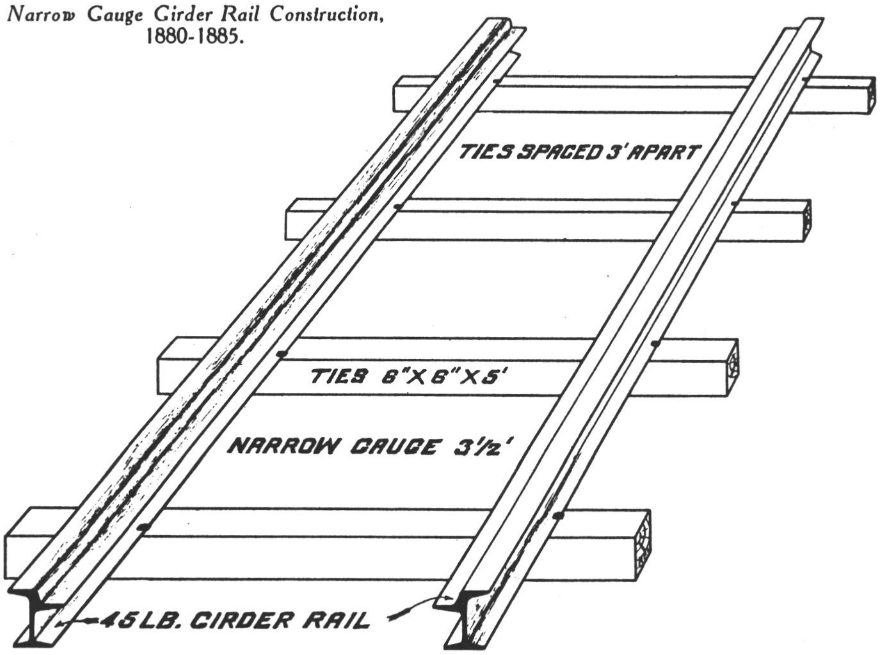


Type of First Street Car Turntable in Minneapolis.
These Turntables were located at terminals of lines and cars were turned on them instead of using the "Y" system that obtains today.

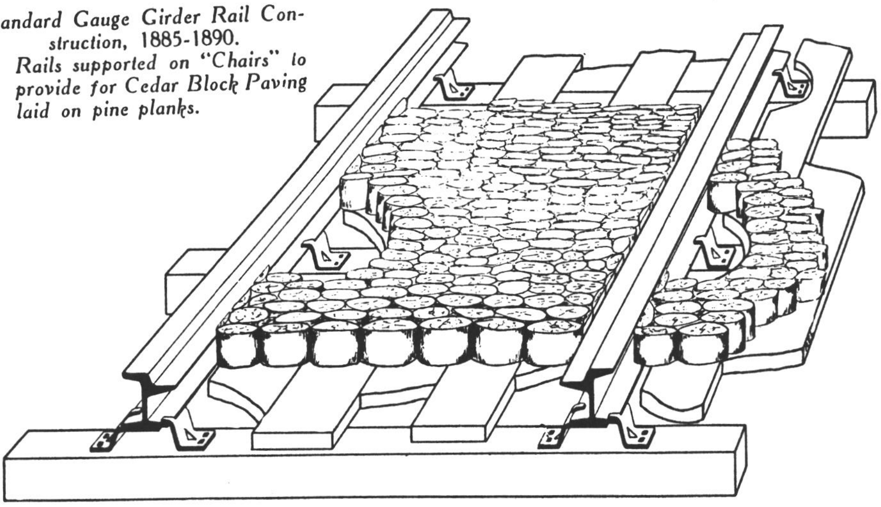

SQUARE SPIKES ½"×½"×4½"
WOODEN BRACE
TIES 4"X5"X5'
STRINGERS 4"X5"
NARROW GAUGE-3½ FT.
STRAP RAIL 25 LBS. PER YD.

Second Street Car Track Construction in Minneapolis.

Narrow Gauge Girder Rail Construction,
1880-1885.


TIES SPACED 3' APART
TIES 6"X6"X5'
NARROW GAUGE 3½'
45 LB. GIRDER RAIL

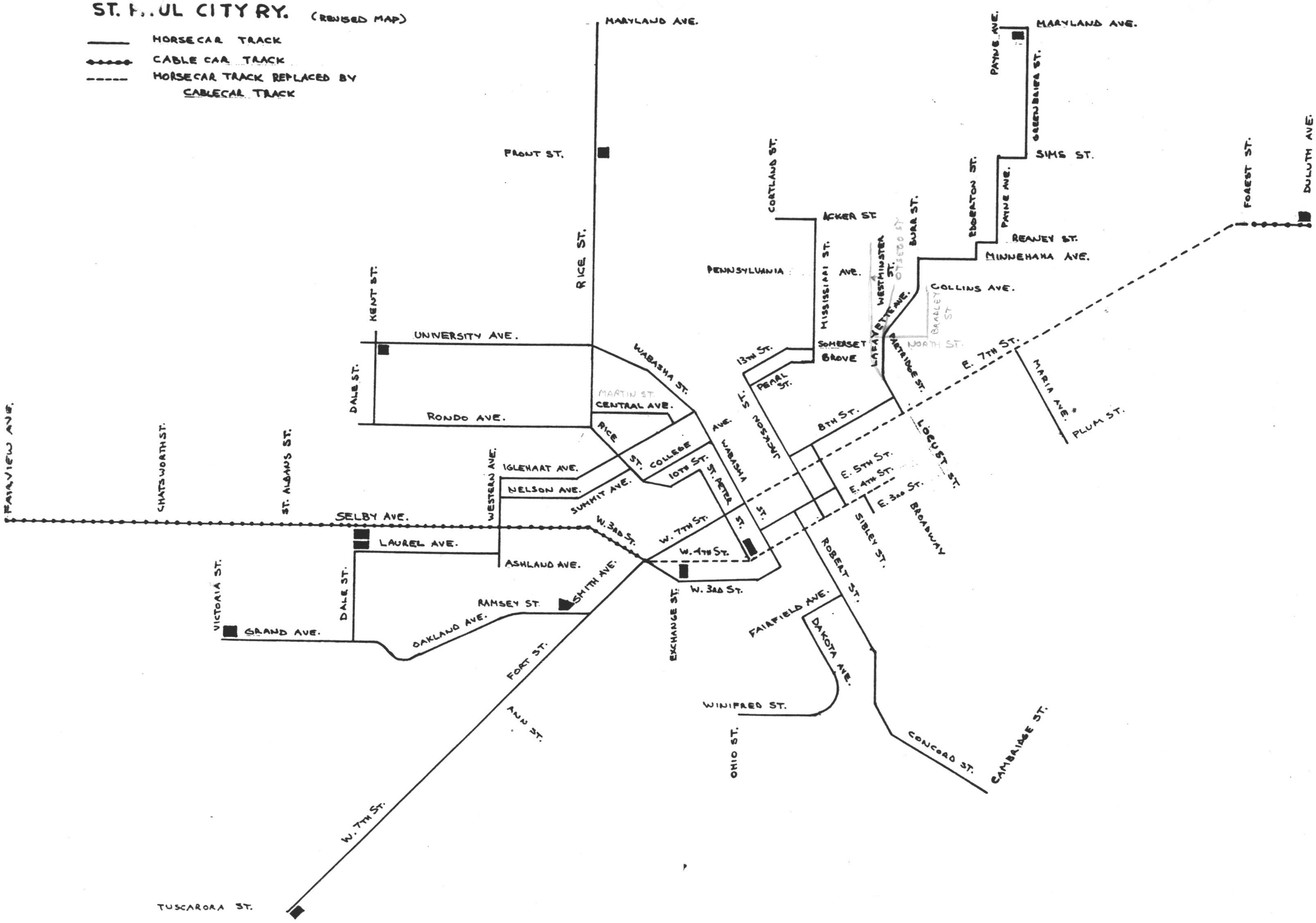
Standard Gauge Girder Rail Construction, 1885-1890.
Rails supported on "Chairs" to provide for Cedar Block Paving laid on pine planks.



ST. PAUL HORSECAR TRACKS

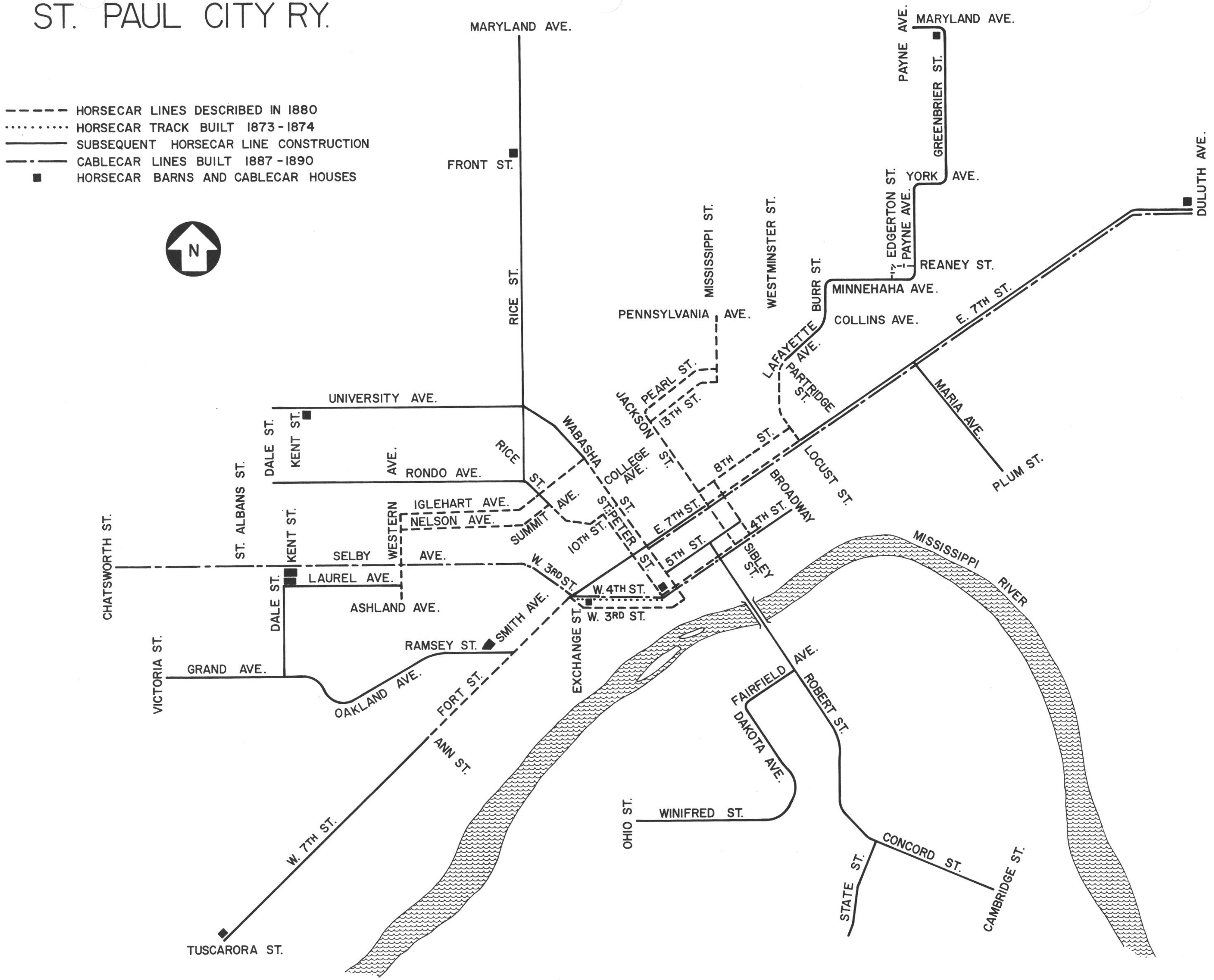
ST. PAUL CITY RY. (REVISED MAP)

—— HORSECAR TRACK
-•-•-•- CABLE CAR TRACK
- - - - - HORSECAR TRACK REPLACED BY CABLECAR TRACK

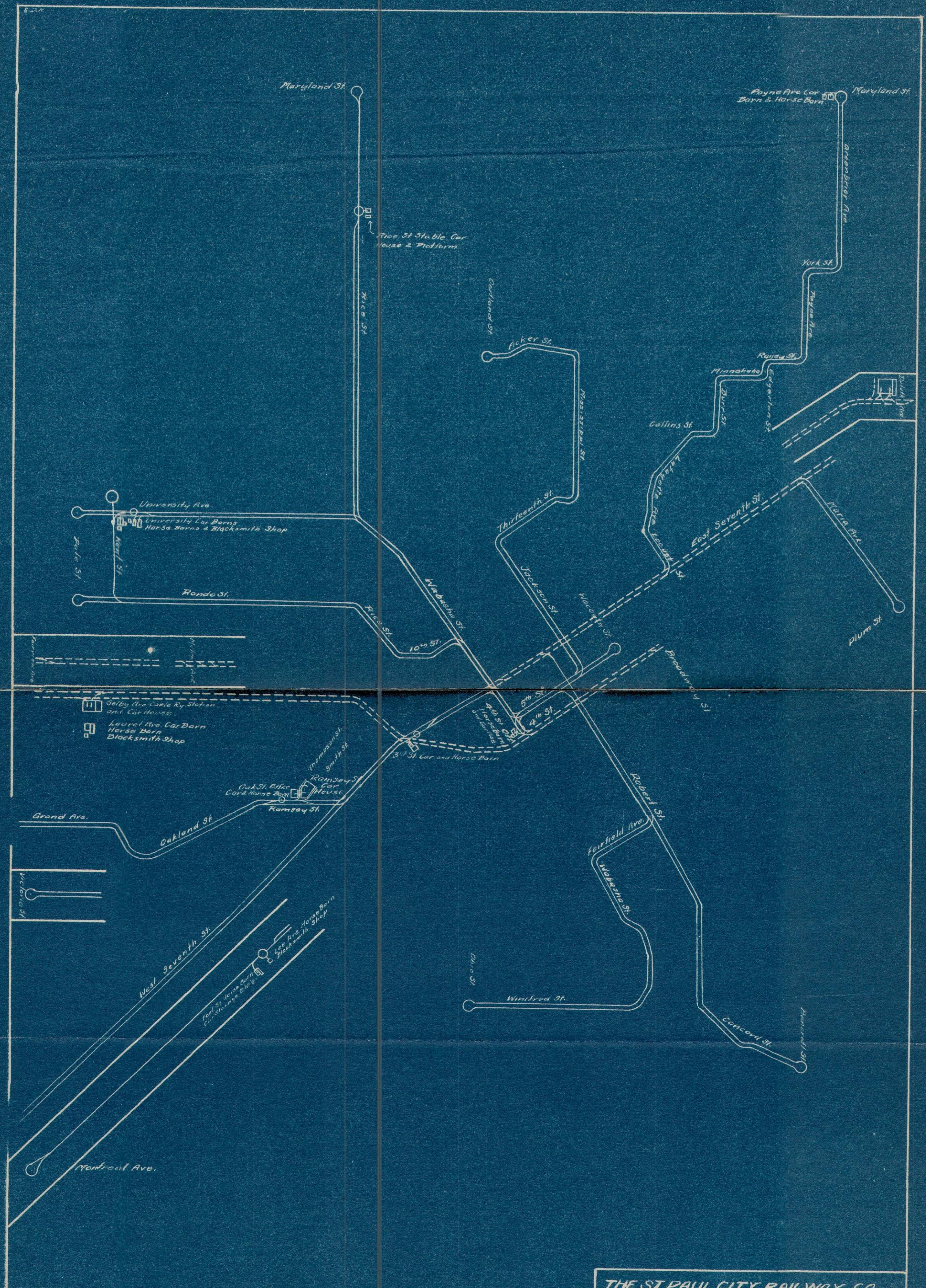


MARYLAND AVE.
FRONT ST.
RICE ST.
KENT ST.
UNIVERSITY AVE.
DALE ST.
RONDO AVE.
WABASHA ST.
MARTIN ST.
CENTRAL AVE.
RICE ST.
COLLEGE AVE.
10TH ST.
ST. PETER ST.
WABASHA ST.
JACKSON ST.
13TH ST.
PEARL ST.
CORTLAND ST.
ACKER ST.
PENNSYLVANIA AVE.
MISSISSIPPI ST.
SOMERSET
GROVE
WESTMINSTER ST.
OTSEGO ST.
LAFAYETTE AVE.
PARTRIDGE ST.
BRADLEY ST.
NORTH ST.
BURR ST.
COLLINS AVE.
EDGERTON ST.
MINNEHAHA AVE.
REANEY ST.
PAYNE AVE.
SIMS ST.
GREENBRIER ST.
PAYNE AVE.
MARYLAND AVE.
FOREST ST.
DULUTH AVE.
E. 7TH ST.
MARIA AVE.
PLUM ST.
8TH ST.
LOCUST ST.
E. 5TH ST.
E. 4TH ST.
E. 3RD ST.
BROADWAY
SIBLEY ST.
ROBERT ST.
FAIRVIEW AVE.
CHATSWORTH ST.
ST. ALBANS ST.
WESTERN AVE.
IGLEHART AVE.
NELSON AVE.
SUMMIT AVE.
SELBY AVE.
LAUREL AVE.
ASHLAND AVE.
W. 3RD ST.
W. 7TH ST.
W. 4TH ST.
W. 3RD ST.
VICTORIA ST.
GRAND AVE.
DALE ST.
OAKLAND AVE.
RAMSEY ST.
SMITH AVE.
EXCHANGE ST.
FORT ST.
ANN ST.
FAIRFIELD AVE.
DAKOTA AVE.
WINIFRED ST.
OHIO ST.
CONCORD ST.
CAMBRIDGE ST.
W. 7TH ST.
TUSCARORA ST.

ST. PAUL CITY RY.



HORSECAR LINES DESCRIBED IN 1880
HORSECAR TRACK BUILT 1873-1874
SUBSEQUENT HORSECAR LINE CONSTRUCTION
CABLECAR LINES BUILT 1887-1890
HORSECAR BARNS AND CABLECAR HOUSES
N
MARYLAND AVE.
FRONT ST.
RICE ST.
UNIVERSITY AVE.
DALE ST.
KENT ST.
RONDO AVE.
AVE.
RICE ST.
WABASHA
IGLEHART AVE.
NELSON AVE.
SUMMIT AVE.
WESTERN
COLLEGE AVE.
ST. PETER ST.
10TH ST.
CHATSWORTH ST.
ST. ALBANS ST.
KENT ST.
SELBY AVE.
LAUREL AVE.
DALE ST.
ASHLAND AVE.
W. 3RD ST.
W. 4TH ST.
W. 3RD ST.
EXCHANGE ST.
SMITH AVE.
RAMSEY ST.
VICTORIA ST.
GRAND AVE.
OAKLAND AVE.
FORT ST.
ANN ST.
W. 7TH ST.
TUSCARORA ST.
PENNSYLVANIA AVE.
MISSISSIPPI ST.
PEARL ST.
JACKSON ST.
13TH ST.
WESTMINSTER ST.
LAFAYETTE AVE.
PARTRIDGE ST.
8TH ST.
E. 7TH ST.
5TH ST.
4TH ST.
BROADWAY
SIBLEY ST.
LOCUST ST.
MARYLAND AVE.
PAYNE AVE.
GREENBRIER ST.
YORK AVE.
EDGERTON ST.
PAYNE AVE.
REANEY ST.
BURR ST.
MINNEHAHA AVE.
COLLINS AVE.
E. 7TH ST.
DULUTH AVE.
MARIA AVE.
PLUM ST.
MISSISSIPPI RIVER
FAIRFIELD AVE.
ROBERT ST.
DAKOTA AVE.
OHIO ST.
WINIFRED ST.
CONCORD ST.
STATE ST.
CAMBRIDGE ST.


Maryland St.
Rice St. Stable Car House & Platform
Rice St.
Cortland St.
Acker St.
Mississippi St.
Payne Ave Car Barn & Horse Barn
Maryland St.
Greenbrier Ave.
York St.
Payne Ave.
Raney St.
Minnehaha
Egerton St.
Burr St.
Collins St.
Lafayette Ave.
Locust St.
East Seventh St.
Maria Ave.
Plum St.
Duluth Ave.
University Ave.
University Car Barns Horse Barns & Blacksmith Shop
Dale St.
Kent St.
Rondo St.
Rice St.
10th St.
Wabasha St.
Thirteenth St.
Jackson St.
Wacouta St.
Broadway St.
Fairview Ave.
Milton Ave.
Selby Ave. Cable Ry. Station and Car House.
Laurel Ave. Car Barn Horse Barn Blacksmith Shop
5th St.
4th St.
4th St. Horse Barn and Car Hse.
3rd St. Car and Horse Barn
Thompson St.
Smith St.
Ramsey St. Car House
Oak St. Office Car & Horse Barn
Ramsey St.
Grand Ave.
Oakland St.
Robert St.
Fairfield Ave.
Wabasha St.
Victoria St.
West Seventh St.
Fort St. Horse Barn Car Storage Bld'g.
Lee Ave. Horse Barn Blacksmith Shop
Ohio St.
Winifred St.
Concord St.
Baird St.
Montreal Ave.

Dotted Lines Indicate Cable Car Tracks

THE ST. PAUL CITY RAILWAY CO.

Map of Horse Car Line Tracks.

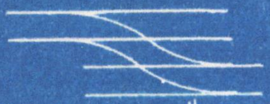
Superseded by Electric Line Tracks.

THE ST PAUL CITY RAILWAY COMPANY

HORSE CAR AND MOTOR LINES.

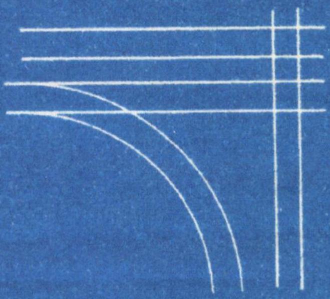
SPECIAL TRACK.

10



COST OF LAYOUT $850

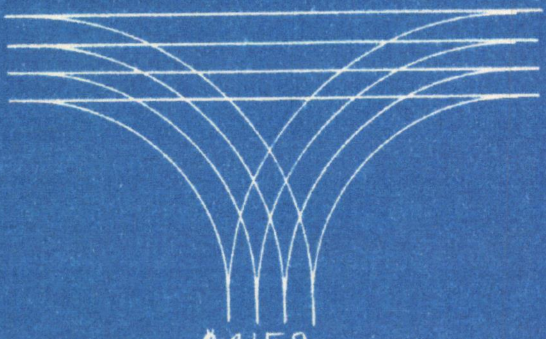
11



$505

5th & Robert

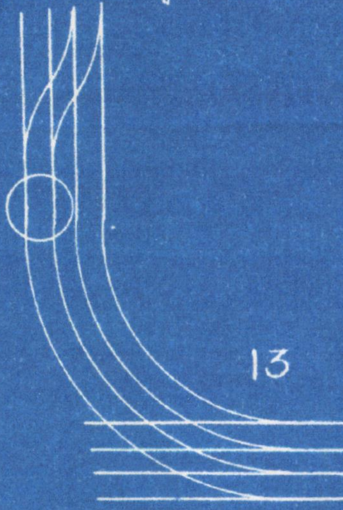
12



$4152

5th & Wabasha

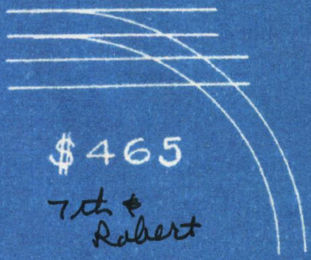
13



COST OF LAYOUT $2234

4th & Wabasha

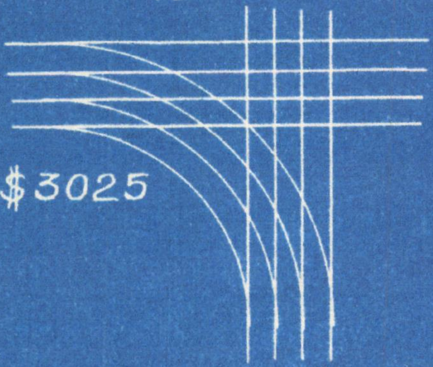
14



$465

7th & Robert

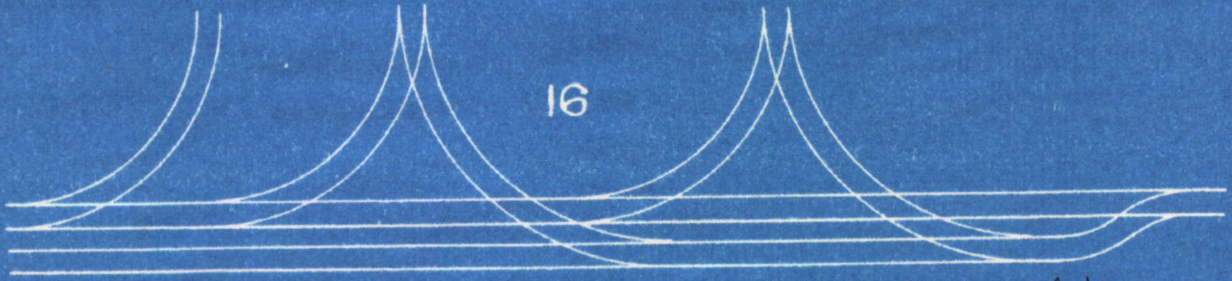
15



$3025

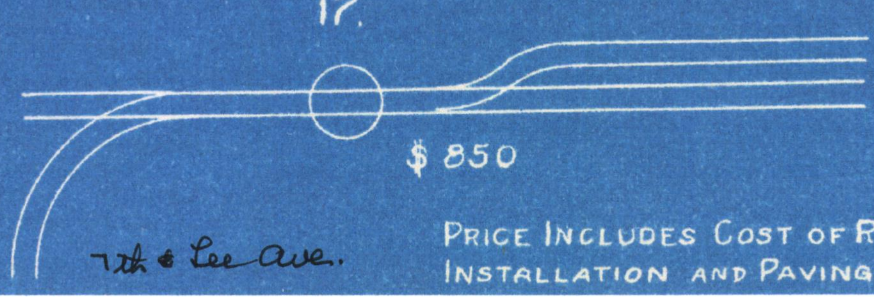
7th & Wabasha

16



COST OF LAYOUT $3480 7th St. & Duluth St.

17.



COST OF LAYOUT $850

7th & Lee ave.

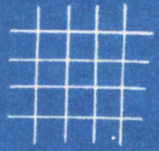
PRICE INCLUDES COST OF RAIL LAYOUT INSTALLATION AND PAVING

THE ST. PAUL CITY RAILWAY COMPANY

HORSE CAR AND MOTOR LINES

SPECIAL TRACK

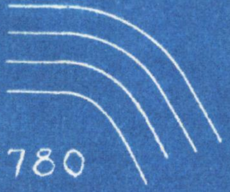
1



COST OF LAYOUT $160

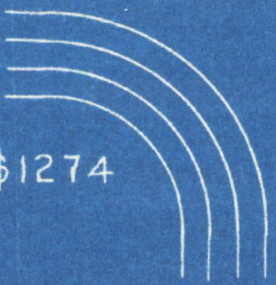
4th & 7th

2



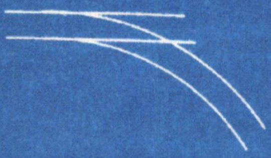
$780

3



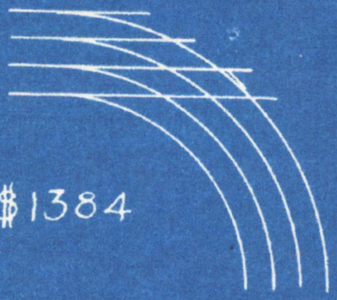
$1274

4



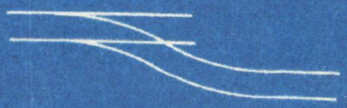
COST OF LAYOUT $425

5



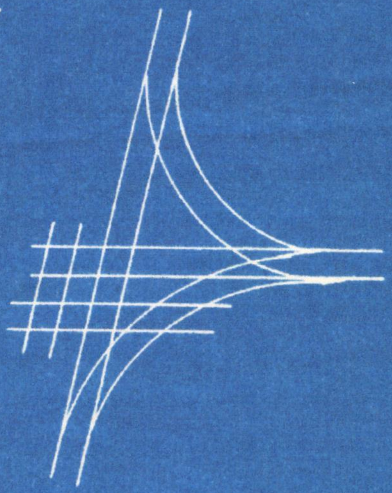
$1384

6



$425

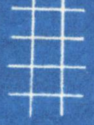
7



COST OF LAYOUT $1754

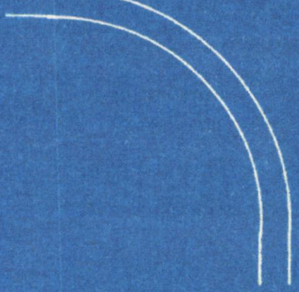
Mpls Henn & Wash

8



$80

9

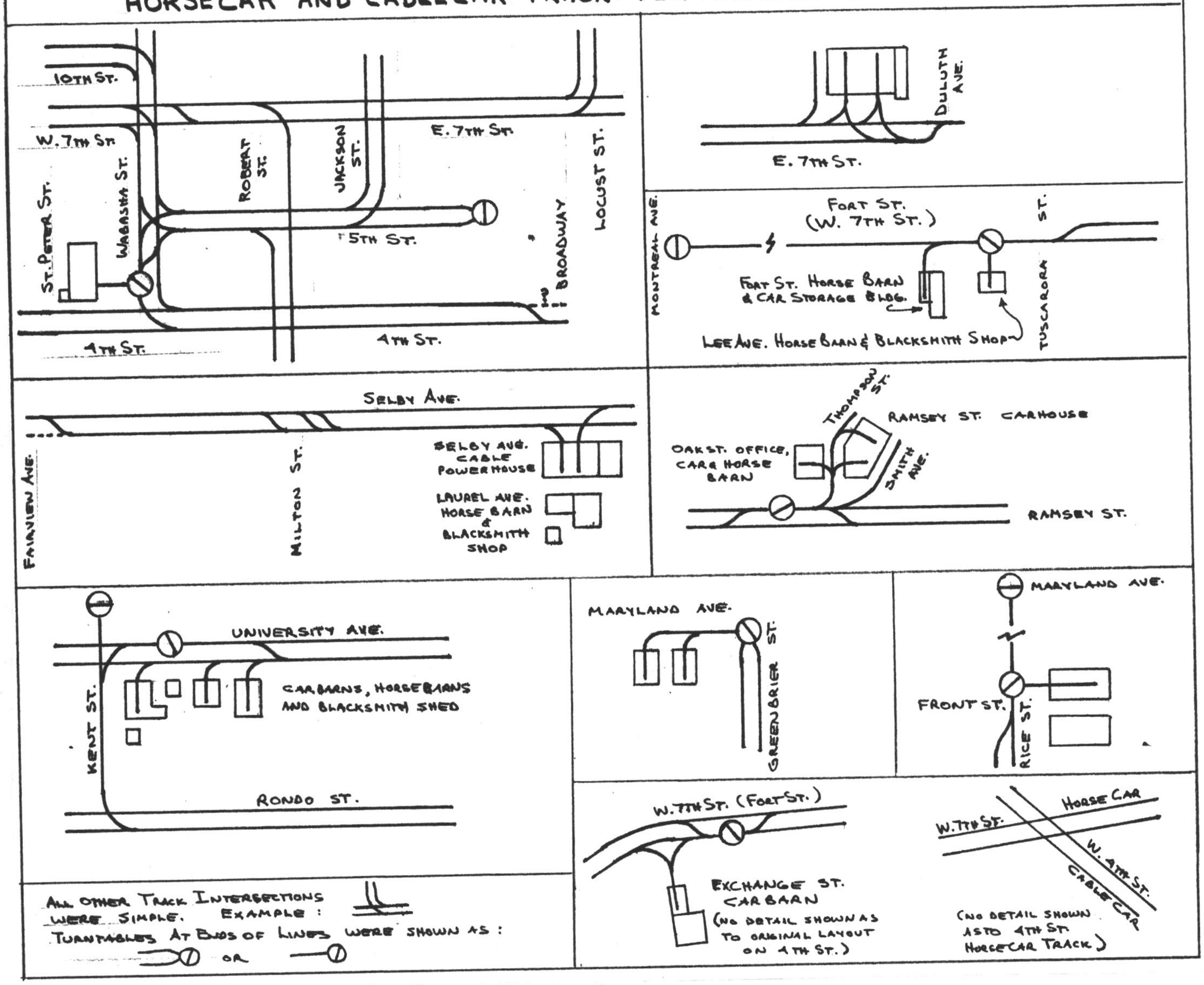


$637

PRICE INCLUDES COST OF RAIL LAYOUT
INSTALLATION AND PAVING

ST. PAUL CITY RY. TRACK DETAILS

HORSECAR AND CABLECAR TRACK- PER A.L. DRUM & CO. VALUATION


10TH ST.
W. 7TH ST.
E. 7TH ST.
ST. PETER ST.
WABASHA ST.
ROBERT ST.
JACKSON ST.
5TH ST.
BROADWAY
LOCUST ST.
4TH ST.
4TH ST.
DULUTH AVE.
E. 7TH ST.
MONTREAL AVE.
FORT ST. (W. 7TH ST.)
TUSCARORA ST.
FORT ST. HORSE BARN & CAR STORAGE BLDG.
LEE AVE. HORSE BARN & BLACKSMITH SHOP
SELBY AVE.
FAIRVIEW AVE.
MILTON ST.
SELBY AVE. CABLE POWERHOUSE
LAUREL AVE. HORSE BARN & BLACKSMITH SHOP
THOMPSON ST.
RAMSEY ST. CARHOUSE
OAK ST. OFFICE, CAR & HORSE BARN
SMITH AVE.
RAMSEY ST.
UNIVERSITY AVE.
KENT ST.
CARBARNS, HORSEBARNS AND BLACKSMITH SHED
RONDO ST.
MARYLAND AVE.
GREENBRIER ST.
MARYLAND AVE.
FRONT ST.
RICE ST.
W. 7TH ST. (FORT ST.)
EXCHANGE ST. CARBARN
W. 7TH ST.
HORSE CAR
W. 4TH ST.
CABLE CAR

ALL OTHER TRACK INTERSECTIONS WERE SIMPLE. EXAMPLE :

TURNTABLES AT ENDS OF LINES WERE SHOWN AS : OR

(NO DETAIL SHOWN AS TO ORIGINAL LAYOUT ON 4TH ST.)

(NO DETAIL SHOWN AS TO 4TH ST. HORSECAR TRACK)

Charles Hathaway built
the St. Paul St. Ry.
first horsecar track 1872

CHARLES HATHAWAY. **FRANK DeHASS ROBISON.**

HATHAWAY & ROBISON,

STREET RAILROAD CONTRACTORS & BUILDERS.

Hathaway & Robison's Patent Transfer Table for Car Houses. Also F. DeH. Robison's Patent Automatic Switch.

Turn Tables, Tram and T Rails, Switch Castings, Spikes and Street Railway Material generally on hand.

Office, No. 14 Case Block, Cleveland, Ohio.

ST. PAUL CITY RY.

HORSE CAR TRACK CONSTRUCTION

1872

Single track built on 3rd St. from Fort St. (W. 7th St.) to Wabasha St., Wabasha St. to 4th St., 4th St. to Jackson St., Jackson St. to E. 7th St., E. 7th St. to Locust St., Locust St. to the intersection of Lafayette Ave. and Westminster (Woodward) St.

Later that year single track was extended on Fort St. (W. 7th St.) west from 3rd St. to Ann St.

1873

Single track on 3rd St. between Seven Corners and Wabasha St. was removed and relocated to 4th St.

Single track was completed November 11th on Wabasha St. from the railroad tracks below 2nd St. to College Ave. and on College Ave. to St. Peter St. ("Wabasha & Park Place" line).

A turntable was installed on E. 7th St. near Jackson St.

1874

Single track built on College Ave. from St. Peter St. to Rice St.

Passing sidings were installed on Wabasha St. between 9th and 10th Sts., and on Fort St. at Walnut St.

Track on Wabasha St. south of 4th St. was removed and a switch installed at 4th and Wabasha so that cars could turn east onto 4th from Wabasha.

1875

A passing siding was installed on 4th St. between Minnesota St. and Robert St. Two passing sidings were lengthened, exact location not specified; one on 4th St. to 400 ft. long, and one on 7th St. to 500 ft. long.

1877

3.75 miles of track were owned at the time of the sheriff's sale in October.

1879

Single track built from Rice St. and College Ave. on Rice St., Summit Ave., Nelson Ave. and Western Ave. to Western and Ashland Ave. (with a turntable at that location), opened May 17th as the "St. Anthony Hill" line.

Single track was also built on St. Peter St. from 4th St. to 5th St. for access to the new horsecar barn.

1880

Track was abandoned on College Ave. from Wabasha St. to Rice St.

Some second track was added, apparently on certain sections of track shared by two lines. One source reports second track built Fort St. (W. 7th St.) to Chestnut St. (location of the passing siding), while the Drum & Co. valuation indicates Ann St.

New single track built during the year was started in April and completed in September.

On	From	To
W. 3rd St. (April)	Seven Corners	Wabasha St.
Wabasha St.	3rd St.	4th St.
Wabasha St.	College Ave.	Iglehart Ave.
St. Peter St. (April)	5th St.	10th St.
10th St.	St. Peter St.	Rice St. & College Ave.
Iglehart Ave.	Wabasha St.	Western Ave.
Western Ave.	Iglehart Ave.	Nelson Ave.
4th St.	Jackson St.	Sibley St.
Sibley St.	4th St.	8th St.
8th St.	Jackson St.	Locust St.
Lafayette Ave.	Westminster St.	Partridge St.
Pearl & Grove Sts.	Jackson St.	Mississippi St.
13th & Somerset Sts.	Jackson St.	Mississippi St.
Mississippi St.	Pearl & Grove Sts.	Pennsylvania Ave.
Jackson St.	7th St.	13th St.

1881

The only construction this year consisted of a single track on Rice St. from Summit Ave. to University Ave. This was built to prevent a competing company from starting construction.

1882

Single track built on:
Laurel Ave. from Western Ave. to Dale St.;
Fort St. (W. 7th St.) from Ann St. to Tuscarora St. and Lee Ave.

Double track built on:
4th St. from Sibley St. to the Union Depot at 3rd St.;
University Ave. from Rice St. to Dale St.

Second track added on:
4th St. from Jackson St. to Sibley St.;
Sibley St. from 4th St. to 8th St.;
Locust St. from 7th St. to 8th St.

Track was abandoned on Western Ave. from Laurel Ave. to Ashland Ave.

1883

Second track added during May on St. Peter St. from 4th St. to 10th St., 10th St. from Wabasha St. to St. Peter St., and on 4th St. from Wabasha St. to

Jackson St.

Single track was completed during November on Dale St. from Laurel Ave. to Grand Ave., and on Grand Ave. from Dale St. to Victoria St.

1884

On	From	To
	Single Track built:	
St. Peter St.	Iglehart Ave.	Martin St.(Central Ave.)
Martin St.	St. Peter St.	Rice St.
From Lafayette Ave. and Partridge St. to Collins Ave. and Burr St.		
	Double Track built:	
W. 3rd St.	Seven Corners	Pleasant Ave.
W. and E. 7th St.	Seven Corners	Jackson St.
Ramsey St.	W. 7th St.	Oak & Forbes Sts.
E. 7th St.	Locust St.	Kittson St.
	Second Track added:	
W. 4th St.	Seven Corners	Wabasha St.
Wabasha St.	4th St.	Iglehart Ave.
Iglehart Ave.	Wabasha St.	St. Peter St.
Rice St.(?)	Martin St.	University Ave.
10th St.	St. Peter St.	Rice St. & College Ave.
Rice St.	College Ave.	Summit Ave.
Summit Ave.	Rice St.	Nelson Ave.
Nelson Ave.	Summit Ave.	Western Ave.
Western Ave.	Nelson Ave.	Laurel Ave.
Laurel Ave.	Western Ave.	Dale St.
E. 7th St.	Jackson St.	Locust St.
Locust St.	7th/8th St.	Lafayette Ave.
Lafayette Ave.	Locust St.	Partridge St.
Jackson St.	4th St.	13th St.
13th St.	Jackson St.	Mississippi St.
Mississippi St.	Pearl St.	Pennsylvania Ave.

A turntable was installed 60 ft. east of Sibley St. on 4th St.

	Track abandoned:	
W. 3rd St.	Seven Corners	Wabasha St.
Wabasha St.	3rd St.	4th St.
4th St.	60ft. east of Sibley St.	Union Depot at 3rd St.
Sibley St.	4th St.	8th St.
8th St.	Jackson St.	Locust St.
Pearl & Grove Sts.	Jackson St.	Mississippi St.
Mississippi St.	Pearl & Grove Sts.	13th St.
St. Peter St.	4th St.	10th St.
Iglehart Ave.	St. Peter St.	Western Ave.
Western Ave.	Iglehart Ave.	Nelson Ave.
Rice St.	Summit Ave.	Martin St.(Central Ave.)

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1885

Double track completed November 14th on E. 7th St. from Kittson St. to Maria Ave.

Second track added on W. 7th St. from Ann St. to Tuscarora St.

1886

On	From	To
	Double Track built:	
E. 4th St.	Sibley St.	Broadway
E. 7th St.	Maria Ave.	Forest St.
Mississippi St.	Pennsylvania Ave.	Acker St.
Acker St.	Mississippi St.	Cortland St.
	Track Abandoned:	
W. 3rd St.	Seven Corners	Pleasant Ave.

It was reported that this track had never been used as the city council had refused permission for operation.

As of December 31st, 28 miles of track were owned.

1887

On	From	To
	Single Track built:	
Maria Ave.	E. 7th St.	Plum St.
	Second Track added:	
Grand Ave.	Dale St.	Victoria St.
	Double Track built:	
Wabasha St.	Iglehart Ave.	University Ave.
Rice St.	University Ave.	Hatch St.
E. 5th St.	Wabasha St.	Wacouta St.
Ramsey St., Oakland Ave., and Grand Ave. from Oak & Forbes Sts. to Dale St. (November)		
Burr St., Minnehaha Ave., Edgerton St., Reaney St. and Payne Ave. from Collins Ave. and Burr St. to York Ave. (Whitall St.?) and Payne Ave.		
Robert St.	5th St.	Concord St. (June)
Concord St.	Robert St.	Bancroft Ave.(September)
	Track Abandoned:	
St. Peter St.	Martin St.(Central Ave.)	Iglehart Ave.
Iglehart Ave.	Wabasha St.	St. Peter St.
Martin St.	Rice St.	St. Peter St.
Rice St.	Martin St.	University Ave.
Dale St.	Laurel Ave.	Grand Ave.

1888

On	From	To	
	Single Track built:		
Kent St.	Rondo Ave.	University Ave.	
Rice St.	Hatch St.	Maryland Ave.	
	Double Track built:		
Rice St.	Summit Ave.	Rondo Ave.	
Rondo Ave.	Rice St.	Dale St.	
Payne Ave., Sims St., and Greenbrier St. from York Ave. (Whitall St.?) to Maryland Ave. (October)			
Maryland Ave.	Greenbrier St.	Payne Ave.	(October)
Fairfield Ave.	Robert St.	Dakota Ave.	(June)
Dakota Ave.	Fairfield Ave.	Winifred St.	(June)
Winifred St.	Dakota Ave.	Ohio St.	(June)
	Track Abandoned:		
Summit Ave.	Rice St.	Nelson Ave.	
Nelson Ave.	Summit Ave.	Western Ave.	
Western Ave.	Nelson Ave.	Laurel Ave.	
Laurel Ave.	Western Ave.	Dale St.	

The Drum & Co. valuation makes no mention of track being built as horsecar track on E. 7th St. from Forest St. to Duluth Ave.

1889-1890

Single track built on Robert St. from 5th St. to 7th St.

Double track abandoned on Jackson St. from 4th St. to 5th St.

An 1889 directory reported 53.3 miles of horsecar track laid with 45, 50 and 52 lb. rail.

Under the category of original electrification the Drum & Co. valuation included track apparently begun as horsecar track but never used as such, being electrified instead, and in one situation, abandoned.
Single track built on W. 7th St. from Tuscarora St. to Montreal Ave.
Single track built in 1889 on S. Robert St. from State St. to Annapolis St. and in 1890 on State St. from Concord St. to S. Robert St.
Double track built in 1889 on 6th St. from St. Peter St. to Minnesota St. which was also abandoned in 1889.

The 1890 U. S. Census (July 1st) reported 29.34 miles of horsecar track.

HORSECAR TURNTABLE LOCATIONS

Acker and Cortland Sts.
Concord and Bancroft Sts.
Fifth and Wacouta Sts.
Fourth and Wabasha Sts.
Grand Ave. and Victoria St.
Greenbrier St.and Maryland Ave.
Kent St. north of University Ave.
Maria Ave. and Plum St.
Ramsey and Thompson Sts.
Rice and Front Sts.
Rice St. and Maryland Ave.
Rondo Ave. and Dale St.
Seventh and Lee Sts.
Seventh St. and Montreal Ave.
7th St. at 3rd St. horsecar barn
University Ave. and Dale St.
University Ave. east of Kent St.
Winifred and Ohio Sts.

HORSECAR TRACK CONSTRUCTION SPECIFICATIONS

From 1875 through 1877 the St.Paul Street Railway used "Crescent" type strap rail, weighing 16 to 19 pounds per yard, laid on wood stringers fastened to wood crossties.

Beginning in 1878 the St.Paul City Railway began using "O.G." rail, weighing 24 to 27 pounds per yard, also laid on wood stringers fastened to wood crossties. This was a form of strap rail with a configuration similar to the head of girder tram rail. As of December, 1878, one mile of single track of this type construction was estimated to cost $3,800.

The 1-1-1920 Valuation reported that later construction was of two types. The first consisted of 36 lb/yd strap rail in 30'0" lengths spiked to 6"x6" longitudinal wood stringers fastened to 6"x6"x6'0" pine crossties laid on 3'0" centers. Direct cost $7,919 per mile. The second and later type consisted of 52, 53 and 54 lb/yd girder rail in 30'0" lengths spiked to 6"x6"x6'0" pine crossties laid on 3'0" centers, with tie plates under the joints. Direct cost $8,646 per mile.

An 1889 directory reported 53.3 miles of horsecar track laid with 45, 50 and 52 lb/yd rails.

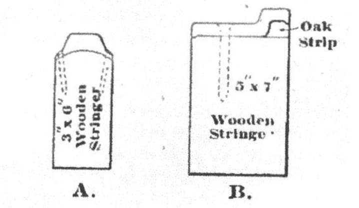
Based upon the construction dates and track measurements in the 1-1-1920 Valuation Report the following table was prepared. The figures **exclude** horsecar barn trackage.

Year	Built	Aband.	Total
1872	2.633		2.633
1873	1.140	.497	3.276
1874	.006	.140	3.142
1877			3.750
1879	1.042		4.792
1880	5.372	.076	10.088
1881	.460		10.548
1882	4.433	.066	14.915
1883	1.672		16.587
1884	7.653	3.955	20.285
1885	2.144		22.429
1886	2.856	.337	24.948
1887	12.100	1.161	35.887
1888	7.655	2.640	40.902
Totals	49.774	8.872	

Separately the Valuation Report provided the following mileage figures.

Abandoned due to development of the system	9.690 miles
Superseded by cablecar lines	6.571 miles
Superseded by electric lines	32.765 miles
Total	49.026 miles

Construction	Abandoned due to Development	Superseded by Cablecar Lines	Superseded by Electric Car Lines	Total
35# Strap Rail			.068 miles	1.935 miles
36# Strap Rail	.687 miles		1.180 miles	
36# Strap Rail & 52# Girder Rail	.776 miles		.588 miles	1.364 miles
52# Girder Rail	7.724 miles	6.211 miles	30.849 miles	44.784 miles
54# Girder Rail	.503 miles	.360 miles		.863 miles
78# Girder Rail			.080 miles	.080 miles
Totals	9.690 miles	6.571 miles	32.765 miles	49.026 miles


3"x 6" Wooden Stringer
Oak Strip
5" x 7"
Wooden Stringer
A.
B.

A. IS CRESCENT RAIL
B. IS OG RAIL

SPCR TRACK CONSTRUCTION
Compiles from Street Railway Journal articles

February 1886: SPCR will lay 1500 tons of steel rails on extensions to their present 25 miles of track. The cost of the extension[s] will exceed $300,000.

June 1886: SPCR is putting down 12 of William Wharton & Co.'s standard turntables with improved self-oiling and adjustable centers; also 12 automatic switches from the same firm.

January 1888; SPCR had, at the beginning of the year [1887] a total mileage of 28 miles. This season [1887] there have been added 5,000 ft. of double track on the Lafayette Ave. line, Payne Ave. extension; 5,375 ft. on the Oakland Ave. extension; 8,625 ft. on Robert, South Robert, Concord and Cambridge streets; 3,000 ft. on Rice St.; 3,000 ft. single track on Maria Ave. to Plum St. This, with the additions now underway, will make a total of 45 miles. They put down three miles more of single track on Dakota Ave., Winifred and Ohio streets in West St. Paul.

St.PAUL CITY RAILWAY HORSECAR AND CABLECAR TRACK CONSTRUCTION
Compiled from Minneapolis Tribune Articles

6-30-1888: SPCR made application to the city council for the repeal of that part of the cable ordinance requiring the company to sell eight tickets for 25 cents, to be used between the hours of 12 to 1 pm and 6 to 7 pm. Eastern capitalists refused to handle company securities while the 3-cent clause was in the charter. The company could not get money on the line already built [Selby Avenue cable]for the same reason . If the clause was stricken out the company could sell stock and order the material at once, the East 7th St. cable line could be completed by August 1st, 1889.This ordinance was finally repealed 7-24-1888. [This explains the delay in construction of the second cable line.]

8-27-1889: A very lengthy article on a franchise dispute with the city council. Three other firms were asking for franchises to use the city streets. As a result SPCR, in response, began tearing up 6th St. from Wabasha west and tracklaying was pushed with all possible vigor. 8-30-1889: began tearing up and excavating St.Peter St. Will have track laid on 6th St. as far as the Ryan Hotel at 6 a.m. thus completing the entire distance contemplated. 8-31-1889: court order served last evening so company quit work on 6th St. 9-20-1889: the dispute was resolved so 6th St. was to be placed back in prior condition.

St.PAUL TRACK CONSTRUCTION
Compiled from Minnneapolis Tribune Articles

5-12-1890: Under the new arrangement a connection will be made by the Lafayette Ave. cars with the new Oakland Ave. electric line. The start will be made at 5th St., running along Broadway to 10th St. and thence to Lafayette Park, where a connection will be made with the old Lafayette line, and running directly to Greenbrier Ave. The construction is being rapidly pushed. The new line will run via Broadway from 5th St. out 10th, Locust, Lafayette, Collins, Burr, Minnehaha, Edgerton, Reaney, Payne, Sims and Greenbrier to Maryland.

8-30-1891: Interview with Thomas Lowry: he reported: Minneapolis 120 miles of electric track; St.Paul 75 miles of electric track plus 15 miles of cable track, 90 miles total.

6-12-1892: There are now 118 miles of track in St.Paul, 11 of which are cable.

CABLECAR LINES

ST. PAUL – CONSTRUCTED

MINNEAPOLIS - PROPOSED

CABLECAR LINES

ST. PAUL

A joint delegation of representatives from the Minneapolis and St.Paul city councils visted Baltimore, Boston, Cleveland, New York and Philadelphia during 1887 at the expense of MSR and SPCR to investigate the best systems of cable railways. The St.Paul city council subsequently applied pressure on SPCR to use cablecars to climb the hilly terrain out of the business district thereby gaining more direct and less roundabout line routings.

The climate was the most severe in which cable technology was to be attempted portending engineering problems due to the considerable expansion and contraction of the yokes plus accumulation of ice and snow in the conduit. Clift Wise of Kansas City was hired to design the installation and supervise the construction of two cable lines: the SELBY AVENUE line, completed in December 1887, and the EAST 7th STREET line, completed in June 1889.

SELBY AVENUE LINE

A double track cable line, 2½ miles long, was constructed during 1887 from 4th St. and Broadway St., on 4th St. and 3rd St. thru Seven Corners, thence over Selby Hill surmounting a 16% grade between Pleasant Ave. and Summit Ave., to Selby Ave., and on Selby Ave. to St. Albans St. The 4.662 miles of track utilizing 54 lb./yd. Providence rail was completed in December, 1887. Operations began January 21, 1888. The combined powerhouse and cablecar house was located on the southeast corner of Selby Ave. and Dale St.

Beginning in September 1888 the powerhouse was enlarged; two Allis 28" x 60" 500 h.p. Corliss engines were installed. An extension of the line on Selby Ave. from St. Albans St. to Fairview Ave. was opened August 24, 1890. The track mileage at this time according the A. L. Drum & Company valuation was:

4th and Broadway to Selby and Chatsworth	5.886 miles
Selby from Chatsworth to Fairview	3.553 miles
Total	9.439 miles

During 1891 the cable terminal was moved back from Fairview Ave. to Chatsworth St., with several crossovers at Milton St., and the former cable portion was rebuilt for electric operation, completed October 14th. The Frank Trumbull January 1893 report listed the total track mileage as 5.782 miles.

The cable was replaced in November 1891 with a new 25,000 ft. long cable manufactured by Roebling's Sons Co. of Trenton, N.J. The powerhouse machinery was also rebuilt at this time. According to Frank Trumbull's January 1893 report it comprised two Allis single-cylinder non-condensing Corliss engines of 600 h.p. each, four boilers of 150 h.p. each, and one Westinghouse 35 h.p. engine for lighting. One cable was driven at a speed of 8.55 miles per hour operating the line east of the powerhouse, and a second cable at 12.936 miles per hour operating the line west of the powerhouse.

The A. L. Drum & Company valuation provided the following information.

Building

One story, brick, 171'0" x 172'6". One story, brick, addition 50'0" x 172'0". One brick chimney, 6" diameter x 150' high. (The measurements on the drawing were from the Frank Trumbull January 1893 report.)

Machinery

Two Allis 28" x 60" Corliss engines, one installed in 1887 and one in late 1888; four Wood fire-tube oil-burning boilers (150 h.p. each); one Westinghouse 35 KW lighting set; two sets of cable winding machinery.

EAST 7th STREET LINE

Construction began in 1888 on the second cable line also using 54 lbs/yd. Providence rail. This line ran on E. 7th St. from Wabasha St. to Duluth Ave., replacing an existing horsecar line. E. 7th St. was on a long steady grade of about 5% out of the downtown area, and that portion of the line was on a viaduct over extensive railroad yards. The completed line opened for service June 16 or 14, 1889. The powerhouse and cablecar house was located on the northwest corner of E. 7th St. and Duluth St.

Frank Trumbull's January 1893 report listed the total track mileage as 5.370 miles. The A. L. Drum & Company valuation reported the total track mileage as 5.346 miles.

The June 1889 issue of the American Railway Journal reported the powerhouse machinery as two Reynolds Corliss engines of 450 h.p. each, three Babcock & Wilcox boilers, and one Robert Poole cable driving engine. The Frank Trumbull January 1893 report listed the machinery as one Allis single-cylinder non-condensing Corliss engine of 600 h.p., three boilers of 150 h.p. each, and one Westinghouse 35 h.p. engine for lighting. One cable was driven at a speed of 10 miles per hour.

The A. L. Drum & Company valuation reported the following information.

Building

One story, brick, 80' x 124'; one story, frame, shed 26' x 32'; one brick chimney 6' diameter x 150' high; one Artesian well. (The measurements on the drawing are from the Frank Trumbull January 1893 report.)

Machinery

Two Allis 28" x 60" Corliss engines; three Babcock & Wilcox water-tube oil-burning boilers (208 h.p. each); one Westinghouse 35 KW lighting set; two sets of cable winding machinery.

BOTH LINES

The 1890 U.S. Census (July 1st) reported 10.02 miles of cable track. The Frank Trumbull January 1893 report listed 11.152 miles, all using 54 lb./yd. rail. The A. L. Drum & Company valuation listed the total mileage at its greatest extent as 14.875 miles, all with 54 lb./yd. rail (slot rail was 52 lb./yd.).

An Edward P. Allis Company, Milwaukee, 1892 advertisement in the Street Railway Journal reported furnishing four Reynolds-Corliss engines of 550 h.p. each to the SPCR. A similar advertisement also dated 1892 of the Babcock & Wilcox Company under cable railways reported furnishing two orders to SPCR during 1888-1890 of 11 boilers totaling 2800 h.p.

MINNEAPOLIS (PROPOSED)

As related in previous chapters, MSR was under public and city council pressure to replace the steam motor trains on 1st Ave. S. MSR did not believe that the time was [redacted] ripe for making any radical changes necessitating heavy expenditures. Minneapolis terrain is generally flat or gently undulating so there was no real justification for cable railways here as there was for St. Paul. However as a public relations move MSR announced April 10, 1889, the decision to build two cable lines. One would replace the Minneapolis, Lyndale & Minnetonka Ry. steam motor line from Bridge Square out 1st Ave. S. and Nicollet Ave. to 31st St. The second would replace the heavily traveled Washington Ave. horsecar line between 20th Ave. N. and Cedar Ave. S. A month later, on June 7, 1889, MSR submitted a formal proposal to the Minneapolis city council. Then came the furious debate over the Anderson, Douglas & Company application for a competetive franchise.

The matter was decided in favor of MSR July 19, 1889, resulting in a city council ordinance directing MSR to build three cable lines.
1. Washington Ave. from 20th Ave. N. to Cedar Ave. S., to be completed by November 1, 1890.
2. Bloomington Ave. from 32nd St. to Franklin Ave., to 8th Ave. S., to 4th St., to 1st Ave. S., to High St., to be completed by November 1, 1891.
3. Hennepin Ave. from Lyndale Ave. to Central Ave., to 6th St. S.E., to 3rd Ave. S.E., to Harrison St., to 29th Ave. N.E., to be completed by April 1, 1891.

City council resolutions in August and September, 1889, required three additional cable lines.
4. Loop line on 1st Ave. S., High St., Hennepin Ave. and Washington Ave.
5. Extension of the first line on Cedar Ave. S., Riverside Ave. S., and 27th Ave. S. to 26th St.
6. 1st Ave. S. and Nicollet Ave. S. from High St. to 31st St.

Under pressure, MSR agreed with the terms of the ordinance and to meet the construction deadlines immediately placed orders for specially designed steam engines as well as a large quantity of track and track materials. On all of the proposed cable lines standard gauge double track was to be laid throughout to the most approved plan with the best materials. Providence girder rail was specified; the slot rail opening was not to exceed 5/8"; and the speed was to be not less than 8 miles per hour. Plans were developed by Clift Wise.

One powerhouse would be located at 3rd Ave. N. and 2nd St. N. to power two cables each, through conduits, for the Washington Ave. and Hennepin-Central lines; a low speed cable would be used for counter-clockwise operation of the High St. loop line. The Nicollet Ave. line would be operated from a separate powerhouse located at Nicollet Ave. and 31st St.

Construction started on an addition to the existing building at 3rd Ave. N. and 2nd St. N. to contain the boilers, engines and cable driving machinery. Construction also started on the powerhouse building on the Nicollet Ave. and 31st St. steam motor line roundhouse property.

As the track and cable materials which had been ordered were received they were stored at three locations: (1) the old Hay Market on 1st St. between 1st Ave. and 3rd Ave., (2) along the route of the 1st Ave. S./Nicollet Ave. line to 31st St., and (3) along the C.M.&StP. Railroad right-of-way on 29th St. Some actual track construction work was undertaken during the winter on the 1st Ave. S./Nicollet Ave. line in the vicinity of Grant St. and Nicollet Ave. although the steam trains continued in operation.

Meanwhile both MSR and SPCR were investigating electric railways and in September, 1889, received permission from the respective city councils to install experimental electric lines. MSR's line was the first to be completed, in December 1889. MSR was so pleased with the operation in winter weather compared to the St.Paul cable lines that it moved rapidly to convert the Minneapolis franchise from cable power to electric power and was able to convince the city council accordingly in January 1890.

According to the 1909 MSR history, all cable engines and track materials were sold as scrap several years later. Reports vary as to the amount spent on cable line materials and machinery that were never used. Frank Trumbull's 1893 report gave the figure as $300,000 to $400,000. F. W. Cappelen in the 1915 valuation study stated that approximately $200,000 to $300,000 was claimed to have been invested. However both the Cappelen and A. L. Drum & Company 1915 valuation studies allowed only the following items and costs.

1. Contract dated 8-24-1889 with Blakeney Foundry Co., Springfield, Ohio for purchase of 14,000 cast iron yokes and 2,400 manholes frames and covers; canceled by agreement dated 1-17-1890 for payment of $17,500
2. Contract dated 9-25-1890 with Herzog Mfg. Co., Minneapolis, Minn., covered

sale of 800 gross tons of cable yokes at $15.00 per gross ton (2,240 lbs.).
Cost of yokes: 800 tons at $28.00 per net ton (2,000 lbs.) $22,400
Sale for scrap: 800 tons at $13.39 per net ton (10,712)
$11,688

3. Contracts dated 8-31-1889, 9-2-1889, and 8-30-1889 with Robert Poole & Sons Co., Baltimore, Md., for purchase of driving machinery, four tension carriages with necessary sheaves, and 24 "U" frames with necessary sheaves.
Amounts paid for material delivered and cancellation of contracts:
3-17-1890: time and material expended per contracts dated 9-2-1889 and 8-31-1889 but countermanded by their order 1-27-1890 $24,230
11-15-1889: 12 "U" frames with sheaves, shafts and bearings per contract dated 8-30-1889 $ 4,219
11-30-1889: 12 "U" frames with sheaves, shafts and bearings per contract dated 8-30-1889 $4,219
Total $61,856
=======

The two powerhouse buildings, including steam boilers and steam engines, were completed as electrical generating stations. The track rails could be used in re-construction of some of the horsecar lines for electric operation. Only the slot rails are unaccounted for; they may never have been ordered or received, or the scrap sale records lost or destroyed in the intervening years.

MINNEAPOLIS STREET RAILWAY CABLECAR LINES
Compiled from Minneapolis Tribune Articles

8-30-1889: Has signed contracts for cable line materials in the amount of $250,000 for construction of the loop and lines on 1st Ave. S. and Washington Ave.
1. Slot and girder rails, 3,000 tons, 12 miles long, O. W. Meysenburg & Co., Chicago.
2. Four Corliss engines, 3,000 h.p. total, E. P. Allis & Co., Milwaukee.
3. Oak lumber for conduits, 600,000 board feet, Raddock Lumber Co., Minneapolis.
4. Cast iron sheaves and "U" frames, Robert Poole & Sons Co.,Philadelphia
The company intends to finish the 1st Ave. S. and Washington Ave. lines before letting any contracts for the remaining cable lines.

9-1-1889: Yesterday MSR let another contract for the cable lines. Driving machinery for the two power houses, Robert Poole & Sons Co. (Over 1,000,000 pounds of iron will be used in the construction.)

10-11-1889: The first consignment of cable material is here. Four carloads of rails and yokes came in yesterday. The work of unloading and distributing along the line of the Union Depot loop and the Grant St. curve will begin today. A large amount of additional material is expected every hour.

3-18-1890: The street railway company is carting away from Nicollet Ave., to a vacant lot on 3rd Ave. S. near Lake St., the quantities of cable materials, yokes, rails, etc. which were last fall distributed along the Motor Line for use this spring. They will remain stored on this lot until the success of the electric railway system has been demonstrated, when they will be sold.

9-21-1890: Clift Wise resigned to go back to New York and assume connections with one of the cable lines. He does not like work on the electric lines.

1-04-1891: Iron purchased for 1st Ave. S. cable line is now being broken to pieces and shipped to the St.Paul Foundry Co. which recently purchased 500 tons. About 100,000 tons [sic] of this cable material was originally purchased.

ST. PAUL

Population in 1890: 133,156

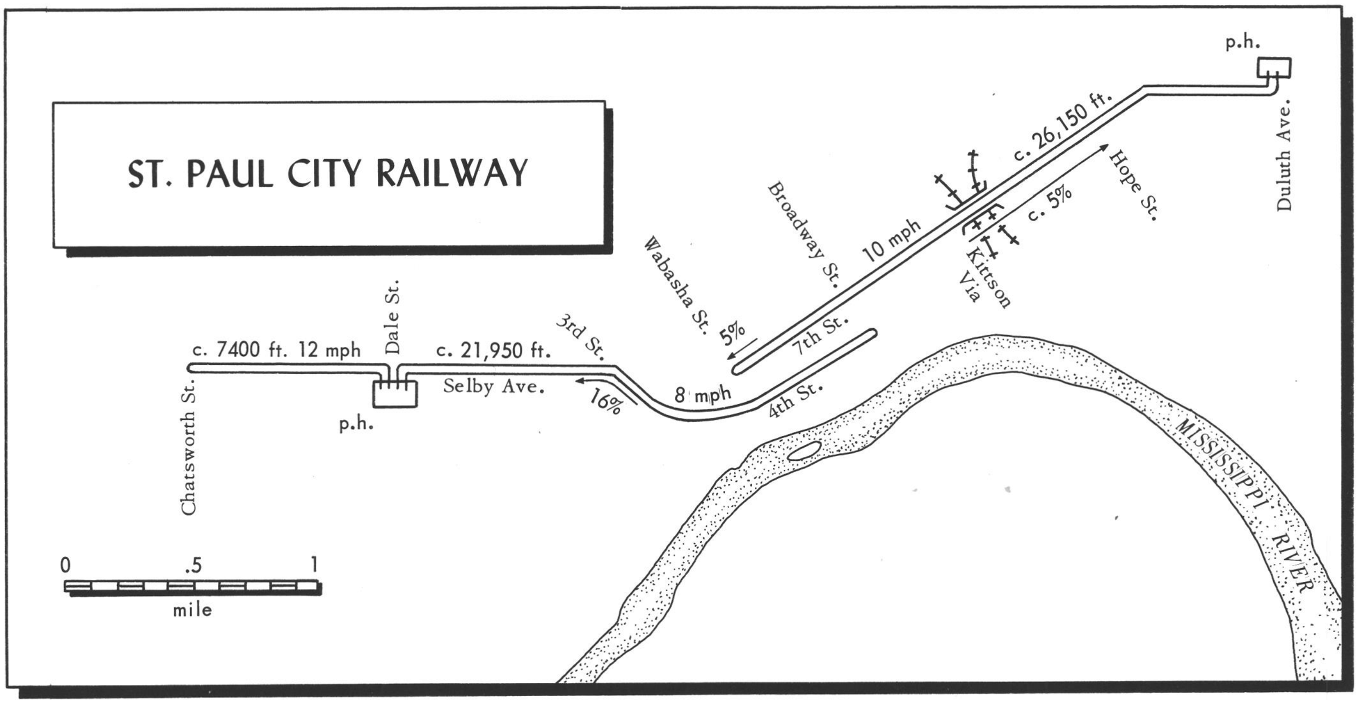
ST. PAUL CITY RAILWAY

Hovey double-jaw side grip *Gauge: 4′-8½″*

St. Paul, an old-established meat-packing and railroad city, is set along the Mississippi with its central business district on flat land at the center of an amphitheater formed by the hills to the west, north and east. The St. Paul City Railway built two unconnected and in certain respects dissimilar cable lines to climb the hills to the west and east. However appropriate the terrain, the climate was the most severe in which cable traction was ever attempted. The company recognized the problems of ice accumulation in the conduit it would face, and also the extreme expansion and contraction of the yokes in prospect, but it was under pressure from the city council to adopt cable technology.

The earlier of the two lines was designed to climb a grade of 16 per cent on Selby Hill directly west of the business district, and then to run along Selby Avenue across relatively flat land through a residential area. It presented engineering problems both in requiring a 16 per cent grade with a curve in it, and in pursuing a course through the central area along 3rd and 4th Streets with curvature at three intersections. The line served a street of wholesaling firms and central offices, ending at the Northern Pacific general office building at Broadway. Since the line was built to face the widest range of temperature of any of the cable installations, the slot was necessarily the widest in the industry, enough so that the SPCA complained of the toe and heel calks of horseshoes being caught in it periodically. Even so, the line was troubled by slot closure and snow accumulation as it was being readied for service. There were local fears that the line would be able to operate summers only.

The company hired Clift Wise of Kansas City to design the installation and supervise its construction.



CLIFT WISE.

He used straightforward Chicago City Railway-Kansas City Cable Railway technology. The line was built in 1887 and opened on January 21, 1888, after several days' delay from a blizzard. Almost immediately, on January 27, 1888, a gripman on an eastbound train lost the grip descending the Selby Hill, causing a derailment which killed one passenger and injured several others. The accident destroyed one of the company's twelve original grips, involved it in lawsuits over the course of several years, and provided one of the main examples for bottom-grip enthusiasts, who argued that the disaster followed directly from the absolute inability of a side grip to recover the cable once it had been dropped unintentionally.

The Selby line at its opening was reported to run to St. Albans Street, a block beyond the powerhouse at Dale Street. Mileage reported for it in 1888 and 1889 of 2.3 is consistent with this. In August 1890 it was reported in the SRJ to be about to be extended; the extension brought it to a point between Milton and Chatsworth Streets, an additional 0.6 miles.* A further projected extension to Fairview Avenue was built as an electric line in 1891.

In the interim, the company opened its east line, a route of about 2.7 miles from 7th and Wabasha in the retailing area to 7th and Duluth at the top of a long grade of about 5 per cent up the hill to the east. Much of the route was on a viaduct over extensive railroad yards east of the central area. Operation began on June 14, 1889. By 1892 it was reported that electric cars were operating in the snow more effectively than the cable cars.

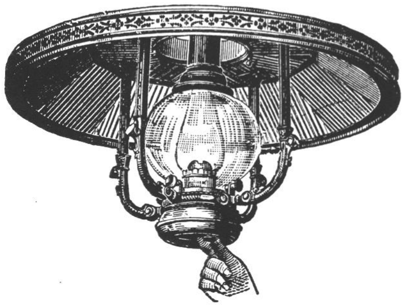
Since the west line contained a grade beyond the capacity of adhesion vehicles and the east line did not, the east line was converted early in the mass replacement of cable lines in the mid-1890s, but the west line survived until some form of mechanical assistance for electric cars could be worked out. The 7th Street route was converted on September 1, 1893, but the Selby line survived until June 3, 1898, when a counterbalance was arranged out of the former Selby cable cars and the conduit on Selby Hill to assist electric cars on the 16 per cent grade. This arrangement, which was almost identical to the second counterbalance in Providence, served until October 10, 1906, when a tunnel was drilled to provide an ascent streetcars could make with ordinary adhesion. Some cable yokes were uncovered when the streetcar tracks were removed in this area in 1954.

The former Selby grip cars, equipped with electric motors for use on the counterbalance, became shop switchers for the Twin City Rapid Transit Company, and somewhat surprisingly, proved to be the last rail vehicles the company operated upon its conversion to buses in the 1950s.

POWERHOUSES: Selby Avenue and Dale Street. EQUIPMENT: Two Allis-Corliss engines of 600 HP each. Became ice plant, and was recently razed.

Seventh Street and Duluth Avenue: EQUIPMENT: One Allis-Corliss engine of 600 HP.

References: Ira Swett *et alia*, *Electric Railways of Minneapolis and St. Paul*, Interurbans, Special No. 14 (1953); collections of Byron D. Olsen and Russell L. Olson.



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*This chronology is not certain. The company's book of operating orders directed the Chatsworth extension to be opened on January 21, 1888.

Jan. 28, 1888.

A BAD BEGINNING.

CATASTROPHY ON A ST. PAUL CABLE LINE.

The Inauguration of a New Line Signalized by a Frightful Accident, Resulting in the Injury of a Large Number of Passengers.—Other Mishaps and Crimes.

A Cable Car Catastrophe.

ST. PAUL, Minn., Jan. 27.—For months a topic of vivid local interest has been as to when the St. Anthony Hill line of cable cars would be opened, the horse cars being quite inadequate to supply the rapidly increasing population in that part of the city. Snows have covered the tracks and numerous accidents have caused repeated postponements, but to-day the cars first began to run with some regularity and the public was allowed to make use of them, and a most serious accident signalized the occasion. About half way up the Third street hill the line turns into Selby avenue at an obtuse angle, and from this curve to the top of the hill the grade is steeper, probably one foot in four. Some days ago an experienced civil engineer pointed out in a published interview the danger of locating a curve at the bottom of so long and steep an incline, but the officers of the road declared it perfectly safe. At half-past one this afternoon a grip and passenger car, both heavily loaded with passengers, started down the hill. It was in charge of Conductor North and Gripman Johnson. The grip had been inspected before it left the end of the line and seemed in perfect order, but about midway down the hill the grip failed to hold the thread and the train rushed down to the curve, reaching which it had attained a speed of twenty miles an hour. The grip car did not leave the track, but the passenger coach whirled off and turned over and was dragged some distance. Many of the passengers jumped off, but the majority of those in the closed car could not do so and all of them, twenty or more, were more or less hurt.

Gripman Johnson says: "We were about half way down Selby avenue hill when the cars began to slide. The grip slipped; no, it didn't, either, they just run away. I don't know why. At the corner they rolled over. I did my best to stop the cars, and threw my weight on the grip, but could not hold the cars. At the curve on West Third street the cars went off and rolled over and over." Johnson is a new man but had been under instruction of an experienced gripman for some days. When he found the grip slipping he called to the conductor but that person was too busy collecting to help him.

The only fatality so far known is that of Merrill L. Saunders, assistant treasurer of the Northwestern Fuel company, who was standing on the rear platform of the passenger car, and with another man was thrown against a tree when the car flew the track. He was crushed and died soon after being taken home. He leaves a family.

The hospitable residents of the neighborhood threw open their houses to the injured and police and physicians were on the ground in a few minutes. Those most seriously hurt were as follows:

Louis Roberts, of Dayton avenue, a lad, had his left hand torn off at the wrist, the arm being badly mangled. His mother is in Colorado. He is a nephew of Chief of Police Clark.

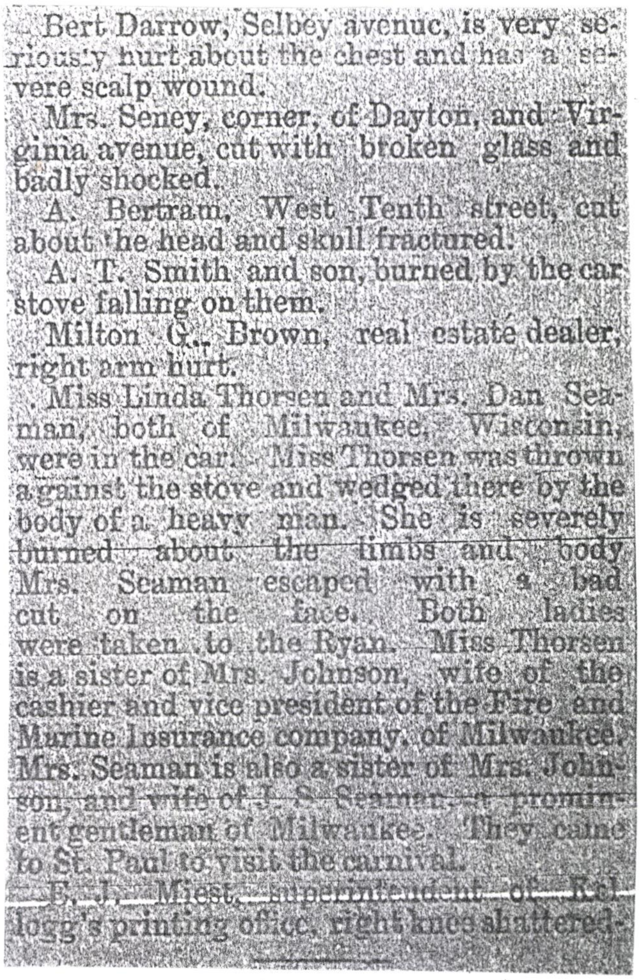
Conductor Frank North, badly cut about the face and hands with broken glass, and perhaps hurt internally.

Geo. H. Watson, Marshal avenue, seriously hurt in both legs, below the knee.

C. A. Baker, hands and legs cut and bruised.

Miss Ada Kerslen, Dayton avenue, seriously cut about the face.

Mrs. Chas. Steele, North Washington street, internally hurt, and cuts.



Bert Darrow, Selbey avenue, is very seriously hurt about the chest and has a severe scalp wound.

Mrs. Seney, corner of Dayton and Virginia avenue, cut with broken glass and badly shocked.

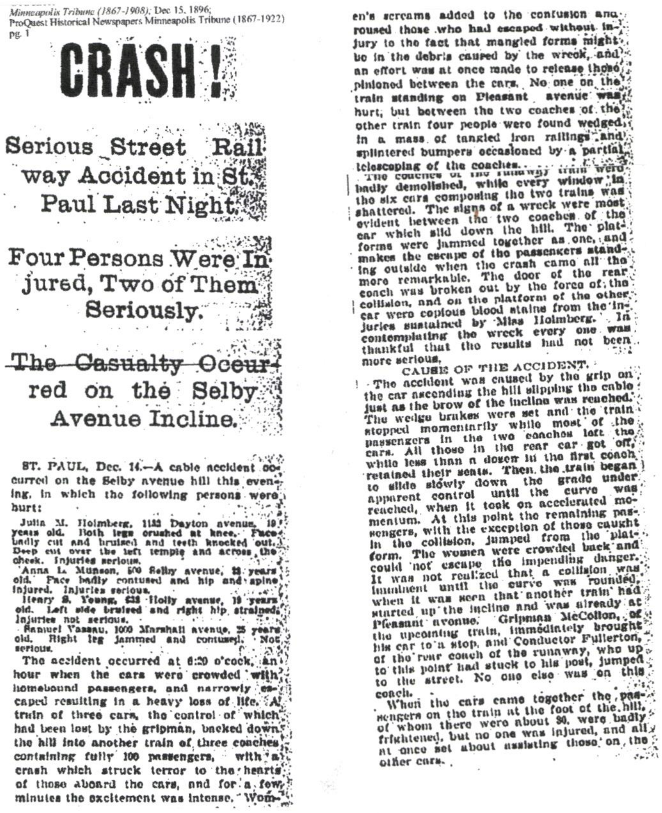
A. Bertram, West Tenth street, cut about the head and skull fractured.

A. T. Smith and son, burned by the car stove falling on them.

Milton G. Brown, real estate dealer, right arm hurt.

Miss Linda Thorsen and Mrs. Dan Seaman, both of Milwaukee, Wisconsin, were in the car. Miss Thorsen was thrown against the stove and wedged there by the body of a heavy man. She is severely burned about the limbs and body. Mrs. Seaman escaped with a bad cut on the face. Both ladies were taken to the Ryan. Miss Thorsen is a sister of Mrs. Johnson, wife of the cashier and vice president of the Fire and Marine Insurance company of Milwaukee. Mrs. Seaman is also a sister of Mrs. Johnson, and wife of J. S. Seaman, a prominent gentleman of Milwaukee. They came to St. Paul to visit the carnival.

E. J. Miest, superintendent of Kellogg's printing office, right knee shattered.



Minneapolis Tribune (1867-1908); Dec 15, 1896;
ProQuest Historical Newspapers Minneapolis Tribune (1867-1922)
pg. 1

CRASH!

Serious Street Railway Accident in St. Paul Last Night.

Four Persons Were Injured, Two of Them Seriously.

The Casualty Occurred on the Selby Avenue Incline.

ST. PAUL, Dec. 14.—A cable accident occurred on the Selby avenue hill this evening, in which the following persons were hurt:

Julia M. Holmberg, 1133 Dayton avenue, 19 years old. Both legs crushed at knee. Face badly cut and bruised and teeth knocked out. Deep cut over the left temple and across the cheek. Injuries serious.

Anna L. Munson, 600 Selby avenue, 22 years old. Face badly contused and hip and spine injured. Injuries serious.

Henry S. Young, 633 Holly avenue, 19 years old. Left side bruised and right hip strained. Injuries not serious.

Samuel Vassau, 1000 Marshall avenue, 25 years old. Right leg jammed and contused. Not serious.

The accident occurred at 6:20 o'cock, an hour when the cars were crowded with homebound passengers, and narrowly escaped resulting in a heavy loss of life. A train of three cars, the control of which had been lost by the gripman, backed down the hill into another train of three coaches containing fully 100 passengers, with a crash which struck terror to the hearts of those aboard the cars, and for a few minutes the excitement was intense. Women's screams added to the confusion and roused those who had escaped without injury to the fact that mangled forms might be in the debris caused by the wreck, and an effort was at once made to release those pinioned between the cars. No one on the train standing on Pleasant avenue was hurt, but between the two coaches of the other train four people were found wedged in a mass of tangled iron railings and splintered bumpers occasioned by a partial telescoping of the coaches.

The coaches of the runaway train were badly demolished, while every window in the six cars composing the two trains was shattered. The signs of a wreck were most evident between the two coaches of the car which slid down the hill. The platforms were jammed together as one, and makes the escape of the passengers standing outside when the crash came all the more remarkable. The door of the rear coach was broken out by the force of the collision, and on the platform of the other car were copious blood stains from the injuries sustained by Miss Holmberg. In contemplating the wreck every one was thankful that the results had not been more serious.

CAUSE OF THE ACCIDENT.

The accident was caused by the grip on the car ascending the hill slipping the cable just as the brow of the incline was reached. The wedge brakes were set and the train stopped momentarily while most of the passengers in the two coaches left the cars. All those in the rear car got off, while less than a dozen in the first coach retained their seats. Then the train began to slide slowly down the grade under apparent control until the curve was reached, when it took on accelerated momentum. At this point the remaining passengers, with the exception of those caught in the collision, jumped from the platform. The women were crowded back and could not escape the impending danger. It was not realized that a collision was imminent until the curve was rounded, when it was seen that another train had started up the incline and was already at Pleasant avenue. Gripman McCollon, of the upcoming train, immediately brought his car to a stop, and Conductor Fullerton, of the rear coach of the runaway, who up to this point had stuck to his post, jumped to the street. No one else was on this coach.

When the cars came together the passengers on the train at the foot of the hill, of whom there were about 80, were badly frightened, but no one was injured, and all at once set about assisting those on the other cars.

St.PAUL CITY RY. CABLE LINES

Compiled from Street Railway Journal articles

January 1888: SPCR report in regard to their new cable road, just completed, that its mileage is 4.662, laid to 4" 8 1/2" gauge, with 54 lb. Providence rail, 16 coaches and 10 grip cars. The company expected to have trouble with the slot of the cable, which is wider than in other cities, the object being to allow for contraction in cold weather. The engine is 600 h.p. The cable will be run at the rate of about eight miles per hour. The cars are 16ft long, with a seating capacity of 30 persons each.

October 1888: The St.Paul council granted permission to increase the width of the cable slot from 5/8" to 3/4".

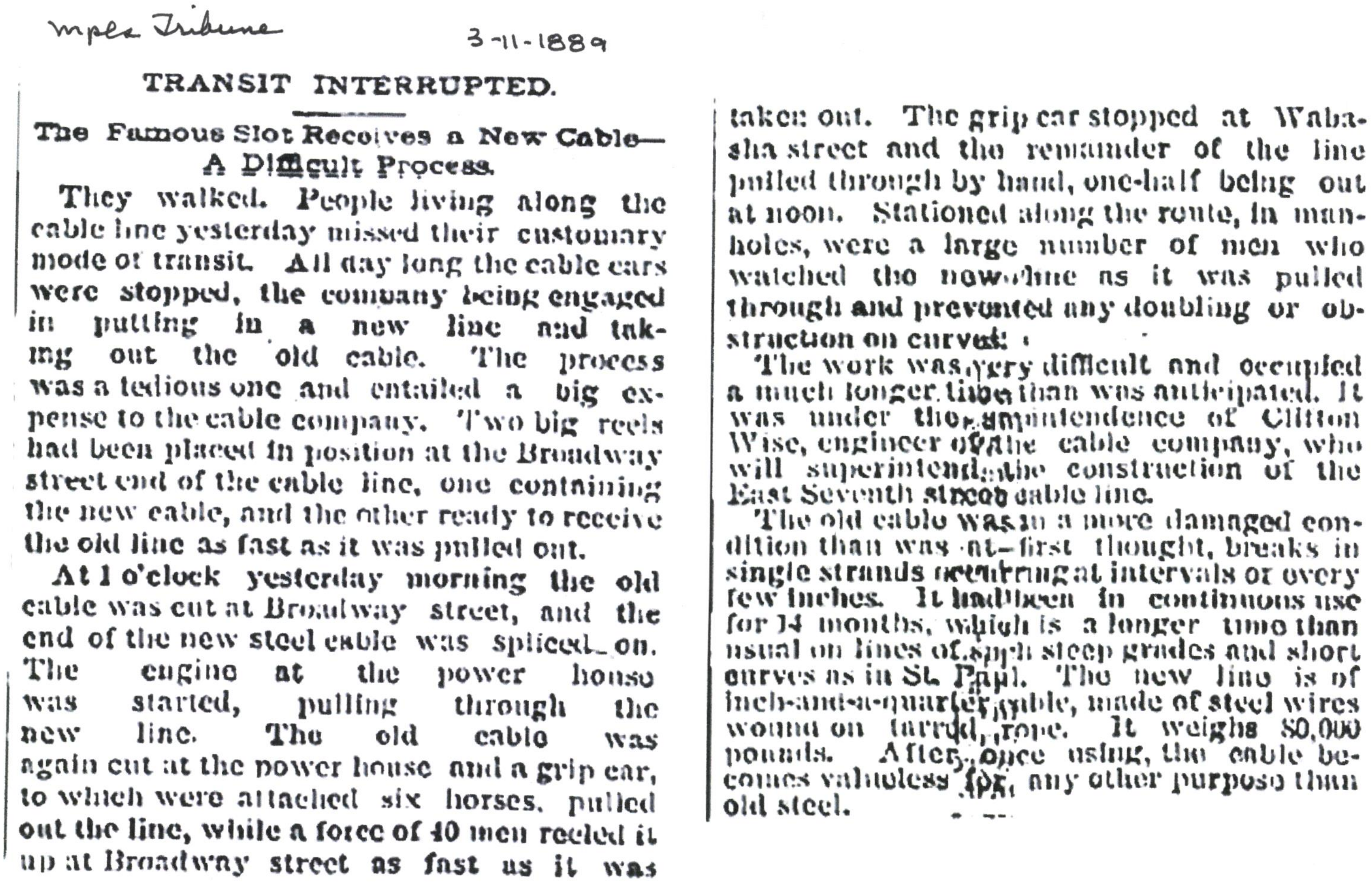
December 1888: Cost of the new cable line is progressing at the rate of 600 ft. of double track per day.

April 1889: A new cable has been laid on the Selby Ave. line by Engineer Clift Wise. Weighs 80,000 lbs., is 1 1/4" in diameter and 5 miles long.

May 1889: One mile of new cable road has been laid and the powerhouse is rapidly nearing completion.

July 1889: The St. Anthony Hill cable line is to be extended to Merriam Park.

October 1889: Selby Ave. Powerhouse: fuel oil consumption has been reduced to 900 gal. per day from 2,100 gal. per day.



Mpls Tribune 3-11-1889

TRANSIT INTERRUPTED.

The Famous Slot Receives a New Cable—A Difficult Process.

They walked. People living along the cable line yesterday missed their customary mode of transit. All day long the cable cars were stopped, the company being engaged in putting in a new line and taking out the old cable. The process was a tedious one and entailed a big expense to the cable company. Two big reels had been placed in position at the Broadway street end of the cable line, one containing the new cable, and the other ready to receive the old line as fast as it was pulled out.

At 1 o'clock yesterday morning the old cable was cut at Broadway street, and the end of the new steel cable was spliced on. The engine at the power house was started, pulling through the new line. The old cable was again cut at the power house and a grip car, to which were attached six horses, pulled out the line, while a force of 40 men reeled it up at Broadway street as fast as it was taken out. The grip car stopped at Wabasha street and the remainder of the line pulled through by hand, one-half being out at noon. Stationed along the route, in manholes, were a large number of men who watched the new line as it was pulled through and prevented any doubling or obstruction on curves.

The work was very difficult and occupied a much longer time than was anticipated. It was under the superintendence of Clifton Wise, engineer of the cable company, who will superintend the construction of the East Seventh street cable line.

The old cable was in a more damaged condition than was at first thought, breaks in single strands occurring at intervals of every few inches. It had been in continuous use for 14 months, which is a longer time than usual on lines of such steep grades and short curves as in St. Paul. The new line is of inch-and-a-quarter cable, made of steel wires wound on tarred rope. It weighs 80,000 pounds. After once using, the cable becomes valueless for any other purpose than old steel.

ST.PAUL CABLE LINE OPERATIONS
Compiles from Minneapolis Tribune Articles

5-12-1890: The present system of transferring the Lafayette streetcars from the junction of Locust St. and E. 7th St. by mean of attaching them at not very frequent intervals with the E. 7th St. cable cars is far from satisfactory to the general public.

5-12-1890: The Selby Ave. extension is now well underway.

8-14-1892: The East 7th Street cable line is to have 5 minute service. The present 7 cars will be increased to 10 cars. Every other car to connect with the Maria Avenue line.

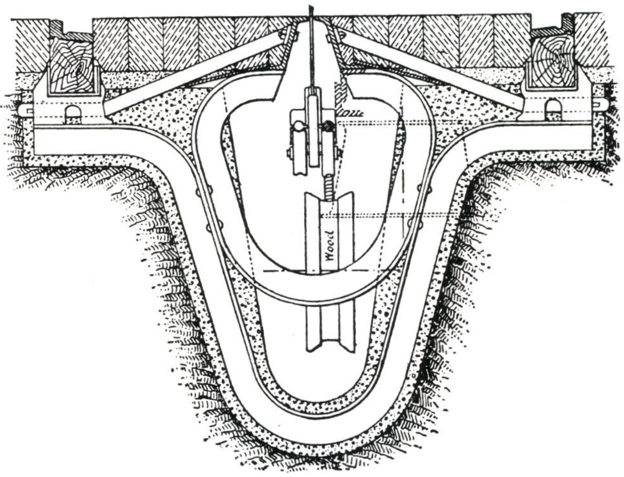
Feb. 1893 SRJ: 10 regular trains are operated on the Selby Ave. line, consisting of one open grip car and one trailer.

4-18-1893: 20 grip cars are now in service on the Selby Ave. line.

6-4-1893: The Selby Hill Cable line safety device will cost SPCR about $17,000.

Selby Avenue Cable Line
Conduit Yokes

"The Cable Car in America" by George Hilton states that SPCR "Hired Clift Wise of Kansas City to design the installation and supervise its construction. He used straightforward Chicago City Railway and Kansas City Cable Railway technology." Published drawings of Chicago and Kansas City yokes pertain to their original installations, January 1882 for Chicago and June 1885 for Kansas City. Extensions to the Chicago system were made in 1887, 1888 and 1891; as they had problems with the original yoke design it was most likely changed for the extensions. Extensions to the Kansas City system designed by Clift Wise took place in June/November 1886 and November 1887 so this yoke design also may have been changed.



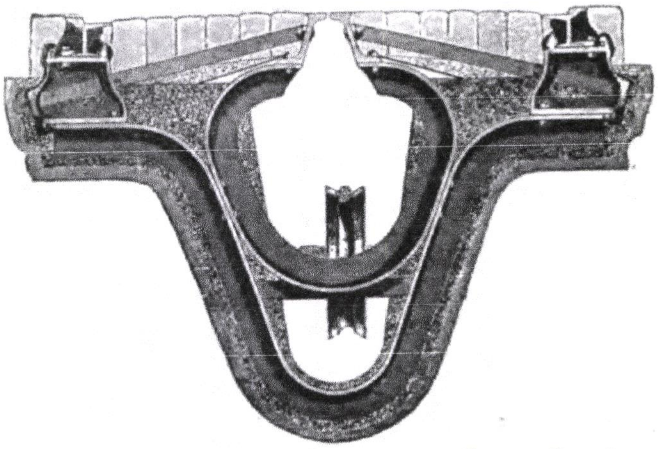
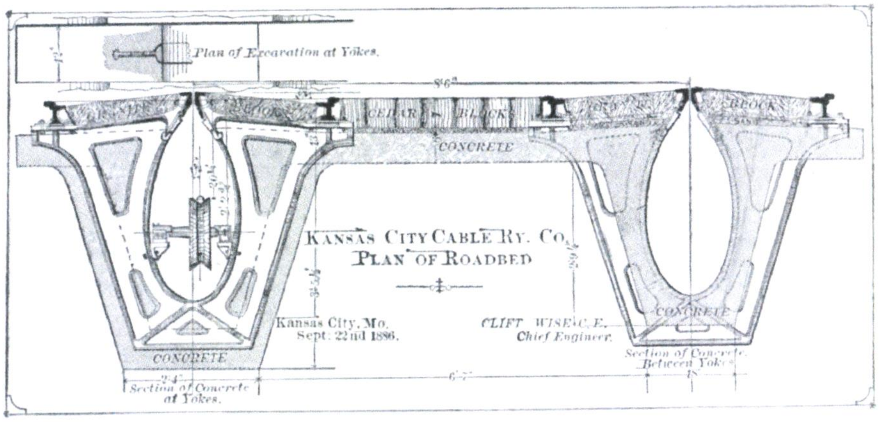
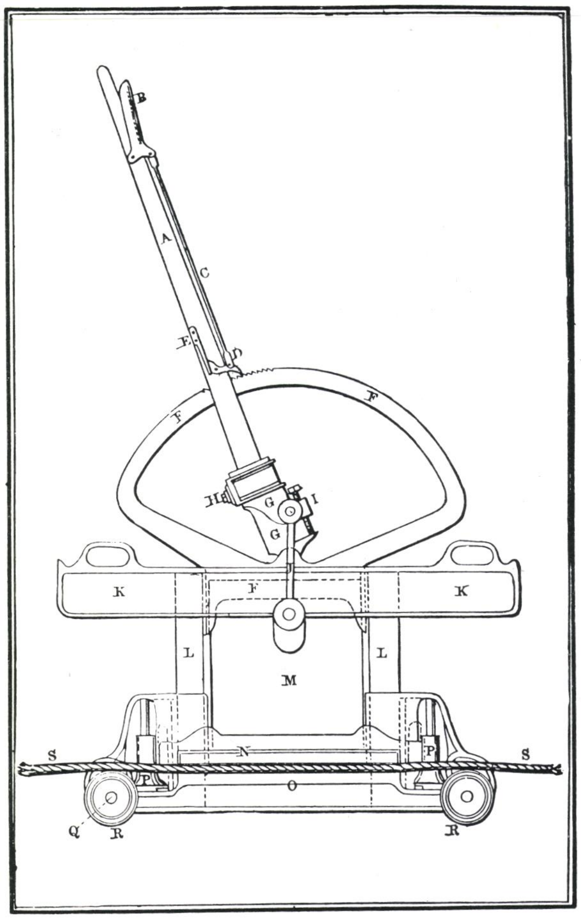


FIG. 140.—ORIGINAL CONSTRUCTION—CHICAGO CITY CABLE RAILWAY—DEPTH OF CONDUIT 36 INCHES.


Plan of Excavation at Yokes.
12'
8'6"
CEDAR BLOCK
BLOCK
CONCRETE
13"
12"
20½"
3'2½"
KANSAS CITY CABLE RY. CO.
PLAN OF ROADBED
3'5½"
29½"
Kansas City, Mo.
Sept: 22nd 1886.
CLIFT WISE C.E.
Chief Engineer.
CONCRETE
CONCRETE
Section of Concrete Between Yokes
2'4"
Section of Concrete at Yokes.
6'7"
18"

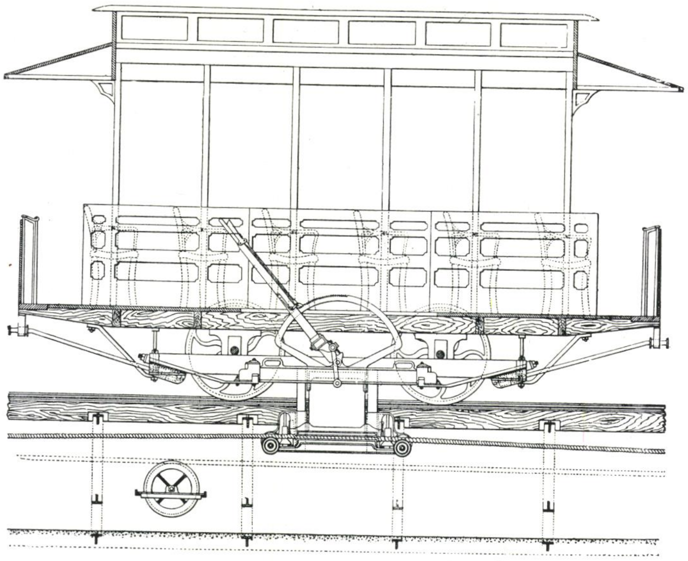
Selby Avenue Cable Line

Street Railway Journal, September 1887, article says the New York Cable Railway Co. was performing the construction work. December, 1887, article says the "national cable grip system" such as now used in Chicago, Kansas City, and St.Paul cost $85,000 mile of double track.



A. Grip Lever. B. Lever Handle. C. Lever Rod. D. Lever Dog. E. Lever Dog Spring, F. Quadrant. Upper G. Adjusting Head. Lower G. Adjusting Shoe. H. Lever Set Screw. I. Adjusting Screw. J. Grip Links. K. Grip Beam. L. Grip Shank. M. Grip Plate. N. Upper Jaw. O Lower Jaw. P. Spools. Q. Roller Journals. R. Grip Rollers. S. Cable.

Hovey's double-jaw side grip for the Chicago City Railway.



Above, Hovey's grip is shown in place in a Chicago City Railway car. Below, Henry M. Lane's grip was developed for hauling horsecars of the Mount Adams & Eden Park up the Gilbert Avenue grade. The grip was attached ahead of the car, as shown. Later versions were mounted below the car in orthodox fashion.

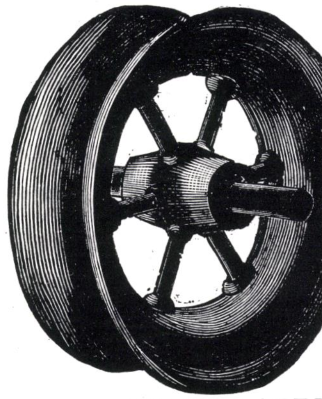
INDUSTRIAL IRON WORKS,

J. H. & C. A. BURTON, Proprietors, Kansas City, Mo.

MANUFACTURERS OF

CABLE RAILWAY MACHINERY AND SUPPLIES

Crossings, Switches, Curves, Tongues, Curve Sheaves, Crown Sheaves, Depression Sheaves, Elevation Sheaves.



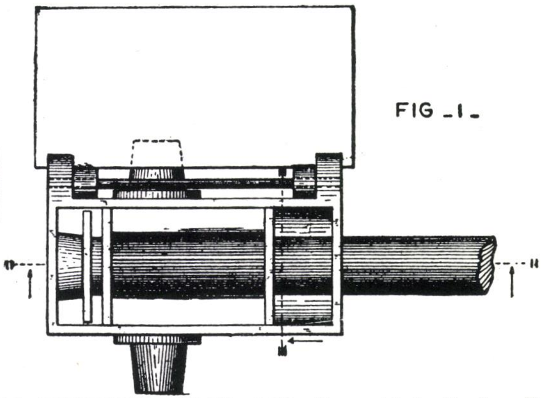
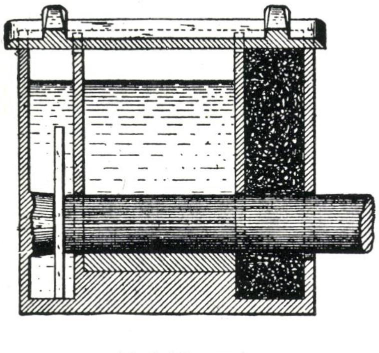


FIG _I_

FIG _II_


PATENT CARRYING PULLEY---Chilled Shafts, put in by Casting, Pressed In, or with Set Screws.

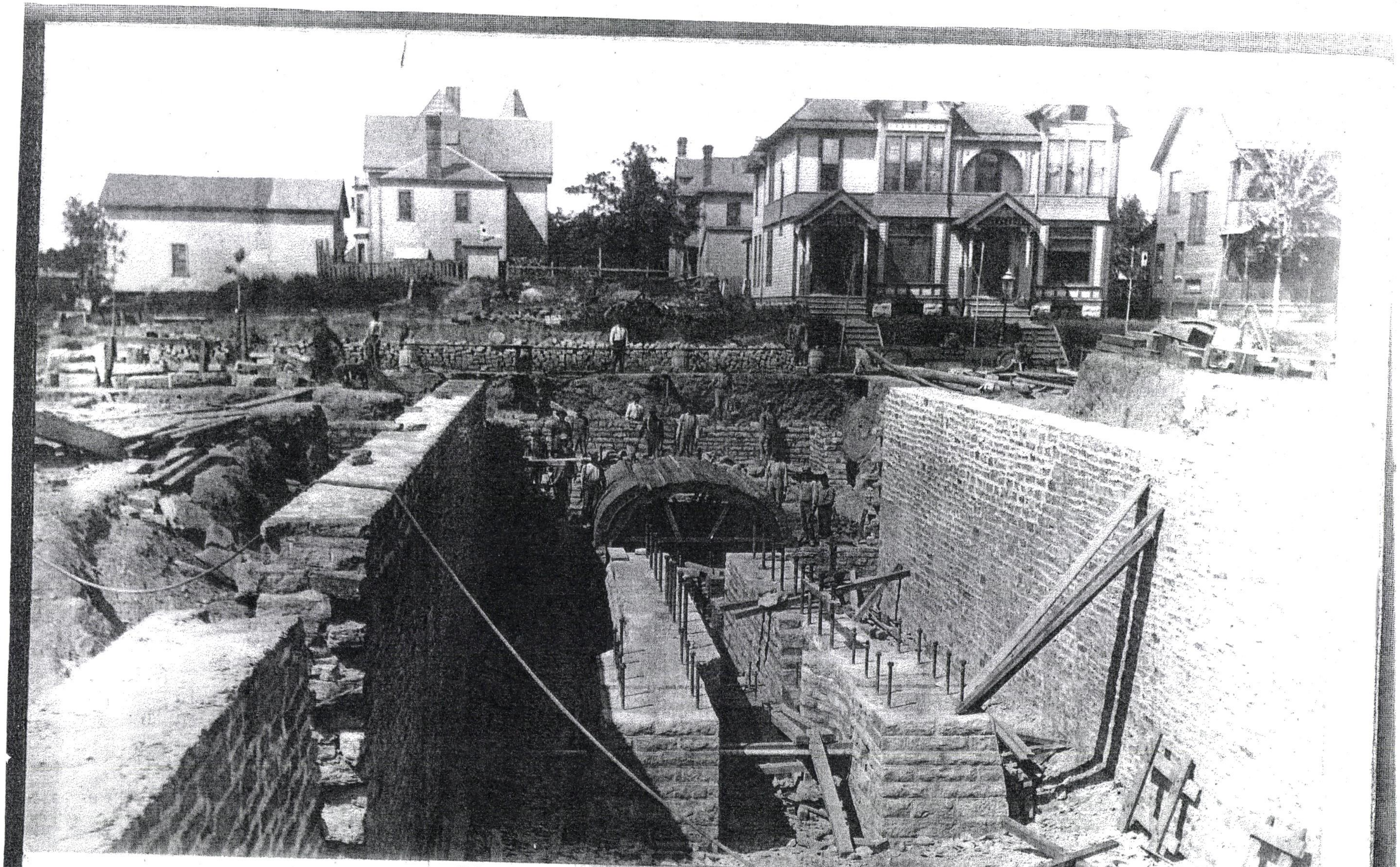
PATENT CARRYING PULLEY BOX.---One Oiling good for Two Months. Dust Proof, Self Oiling, Removable Bearings, No End Play to Shafts, Adjustable in Conduit, Cheapness, No Skilled Labor Necessary.

Splicing Tools, Wrenches, Engineers' Supplies. Correspondence Solicited, Inspection Invited, Satisfaction Guaranteed.

C. A. BURTON, Supt. **Office and Works, 1212 & 1214 W. 8th ST., Kansas City, Mo.**

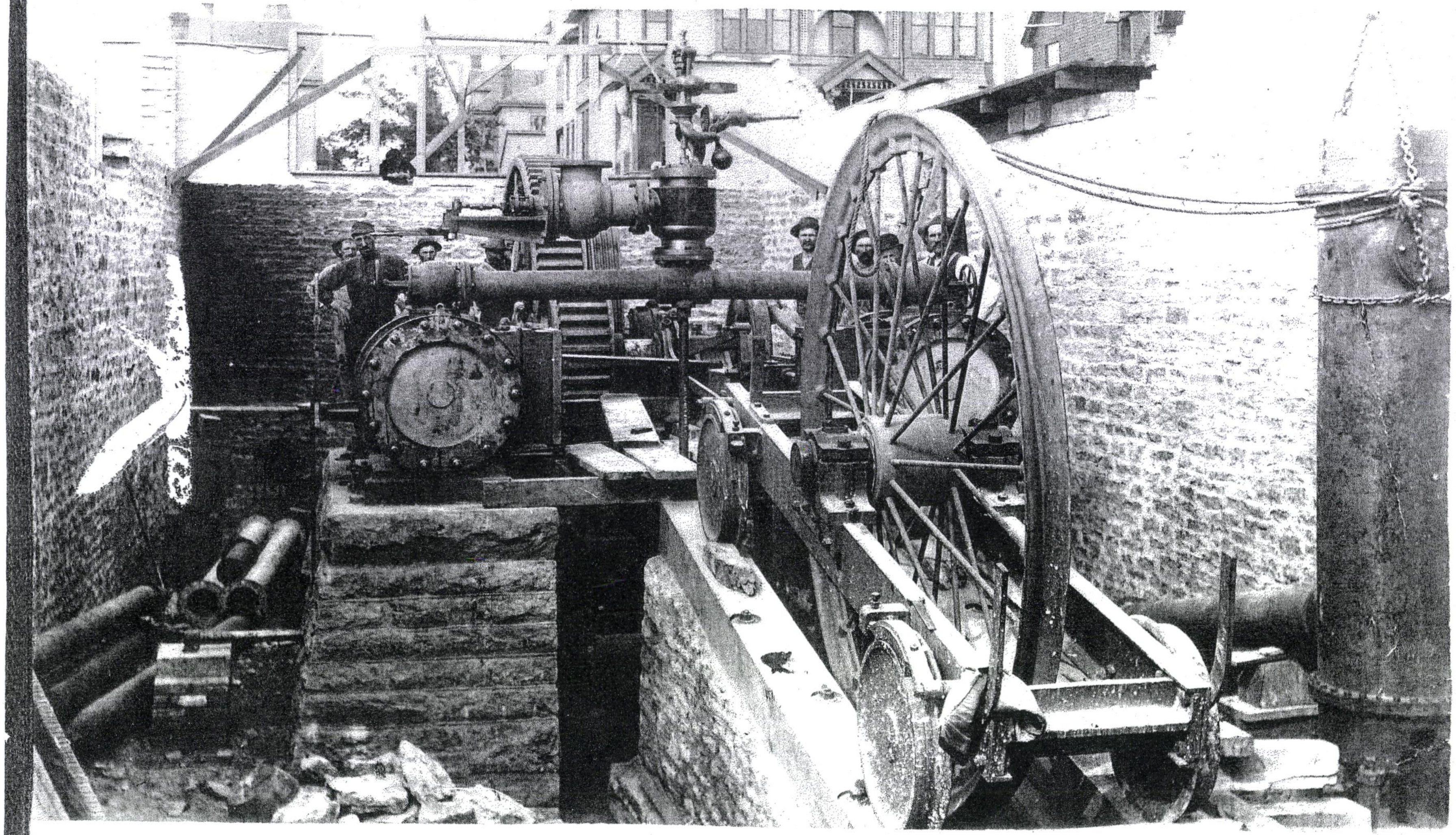
HAVE FURNISHED THE

St. Paul Cable Co	1,800	pulleys and boxes	complete
Metropolitan Cable Co., of Kansas City	3,000	"	"
Kansas City Cable Co., " "	1,200	"	"
Troost Ave. Cable Co., " "	1,200	"	"
Independence Ave. Cable Co., "	1,000	"	"
Washington St. Cable Co., "	650	"	"
People's Cable Co., of Kansas City.		a full	equipment
The Elevated Ry. Co., "		"	"
The Riverview Cable Co., "		"	"
Washington & Georgetown Ry. Co., of Georgetown, D. C.	1,200	pulleys and boxes	complete
People's Cable Ry. Co., of St. Louis.	1,700	"	"
And others.			



St Paul Cable Ry Engine Bed

AVERY® PV119ED



St Paul Cable Ry Tension pulley

Selby east of Dale looking north

ST. RY. GAZETTE DECEMBER 1888

MINNESOTA.

Duluth.—The West Duluth Street Railway company, composed of Messrs. Shannon, Elder, Stowell, Tanner, Hurlbut and R. H. Harris, is being formed, with authorized capital of $100,000, to build surface and elevated roads in West Duluth.

St. Paul.—Engineer Clift. Wise, of the St. Paul City Railway Co., has done a piece of rapid cable railway construction. He finished one mile of double track cable road November 23, which is undoubtedly the best and cheapest road ever built. The cold weather approaching they were obliged to stop work, but managed to lay all the iron work and complete the concreting in just twelve days for the one mile of double track. The greatest force of men employed at any one time did not exceed 500. The yokes are cast-iron. The common yokes weigh 450 pounds and the pulley yokes 475 pounds, and were able to withstand a pressure of 90,000 pounds before breaking. This test was made under hydraulic pressure, at the St. Louis Car Wheel Co.'s works, St. Louis, Mo. It is the strongest yoke yet made. The slot rail weighs 58 pounds per yard, is of an improved kind, invented by Col. P. F. Barr. Instead of using the objectionable bolt to fasten it to the yoke it is keyed, thus simplifying the work and lessening the cost considerably of laying the work.

The tram rail is what is known as the Providence Girder, weighing 54 pounds per yard; it is fastened on each side with a wedge, thereby obtaining the correct gauge. Concrete is used only around the bottom of the yokes for foundation and half-way up the sides of the conduit The balance of the conduit is sheeted with dry white oak saturated with coal tar. The conduit is egg-shaped at bottom and forty-two inches deep. The paving is granite. The whole construction is by far the best and cheapest and the fastest laid of any yet built. The foundations for the power house and for the machinery and engines are finished, also the smoke-stack, which is 162 feet high. The building will be 250x166'. The machinery is being built by the well-known firm of Poole & Hunt, Baltimore, Md., whose work on cable machinery is unexcelled. There will be two 28x60' engines, made by E. P. Allis & Co., Milwaukee; there will be three Babcock & Wilcox boilers 624 horse power. All of this work will be put in in the spring, and the road, which will be 2.67 miles, running by June 1st.

Besides this, a new plant has been put in for the old road, which will be a duplicate of the plant for the new road. They are getting it under cover now and expect to have it running by February 1st.

SRG JAN 1889

The Barr Cable Railway System.

Col. P. F. Barr, of the St. Paul (Minn.) City Railway Co., writes, under date of December 15:

During the year 1887 this company constructed two and one-third miles double track cable railway, and it was put in operation about February 1st of the present year.

This was constructed very similar to other cable railroads in existence. During the progress of this work, and after examining all other roads which had already been constructed, the writer became convinced that a more simple, durable and consequently cheaper conduit could be constructed.

Plans were made and patents obtained with this idea, and late in the season this company commenced the construction of an additional line of cable railway, two and two-thirds miles, double track, under this system; about one mile of which has been completed, and work closed down for the winter. They succeeded in being able to construct five hundred to six hundred feet of double track per day, of as substantial, if not the most substantial, of any road in existence at a very much reduced cost.

It is expected that construction will be resumed about April 1st next, and that the road will be in full operation about June 1st.

All persons interested in street railroad transportation are cordially invited to examine this construction, either now or hereafter, and any further information desired will be freely given.

SRG APRIL 1889

St. Paul—One mile of the new cable road has been laid, and work is being pushed on the superstructure of the new cable house, and the building will be ready for the machinery (which is now on its way here from Baltimore), about the middle of next month.

One thousand tons of slot and girder rails will be used in the construction of the road, and 7,000 yokes to support the rails will be placed about four feet apart. Ten cars of yokes will arrive from St. Louis this week.

Chief Engineer Clift Wise has little doubt that the cars will be running at the appointed time.

SRG JUNE 1889

MINNESOTA.

St. Paul—The cable rope for the East Seventh St. cable line, which recently arrived here from Roebling's factory, Trenton, N. J., is 30,000 feet long and 80,000 pounds in weight. Sixteen new cars for use on this road have already arrived, and Chief Engineer Clift Wise states that the line will be in operation by the middle of June without a doubt.

H. M. KEBBY.

Mr. Kebby's first experience in cable railway practice was in 1883 on the Market Street system of San Francisco. From this city

H. M. KEBBY.

he went to Los Angeles, where he was engineer and superintendent of probably the first single track cable railway ever built. From Los Angeles Mr. Kebby moved in 1887 to St. Louis, where he was assistant engineer to A. W. Wright, on the Citizens' & Olive Street Line. In the following year he designed the plans for the East 7th Street line and the Selby Avenue power house of the St. Paul City Railway Company, of St. Paul, Minn.

In 1889 Mr. Kebby returned to St. Louis, and as engineer for Wright & Meysenberg built the People's Railway on 4th Street and Chouteau Avenue. In the following year, as engineer for the firm mentioned, he drew up the plans for the Broadway line of St. Louis, including the power houses, and in 1891 and 1892 was chief assistant engineer to A. W. Wright on the Blue Island Avenue and Halstead Street cable lines of the West Chicago Street Railway Company.

Mr. Kebby has been connected with a number of other engineering enterprises, and is now chief engineer of the American Railway Construction Company, successors to Wright & Meysenberg.

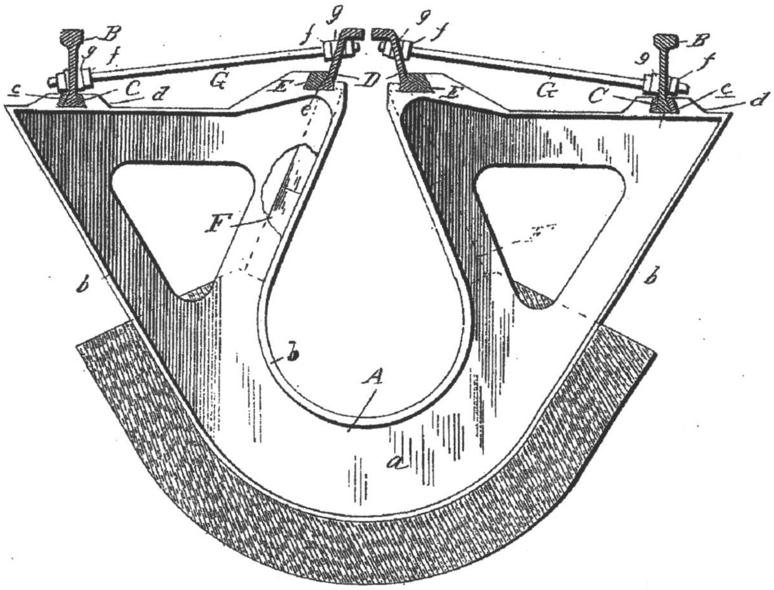
7-12-1889 St Paul Newspaper
New York Cable Construction Co.
mentioned regarding 160,704
lbs (169,704?) of slot
steel for E. 7th St cable
line. Cost $7,630.16

(No Model.)

P. F. BARR.

CABLE RAILWAY.

No. 386,178. Patented July 17, 1888.



WITNESSES:
C. H. Mauder.
E. H. Bond.

INVENTOR.
Pinckney F. Barr.
BY T. J. W. Robertson.
ATTORNEY.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

PINCKNEY F. BARR, OF ST. PAUL, MINNESOTA.

CABLE RAILWAY.

SPECIFICATION forming part of Letters Patent No. 386,178, dated July 17, 1888.

Application filed April 9, 1888. Serial No. 270,053. (No model.)

To all whom it may concern:

Be it known that I, PINCKNEY F. BARR, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Cable Railways, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to certain new and useful improvements in cable railways, and relates more particularly to the construction of the track and the conduit, the object being to improve and cheapen the previous constructions of this character, and to facilitate repairs when necessary.

To these ends the invention consists in the peculiarities of construction, and the combinations, arrangement, and adaptation of parts, all as more fully hereinafter described, and then particularly pointed out in the claim.

The invention is clearly illustrated in the accompanying drawing, which, with the letters of reference marked thereon, forms a part of this specification, and which represents a vertical transverse section through the conduit.

Referring to the details of the drawing by letter, A designates the yoke formed with a web, *a*, and the flange *b* around its outer and inner margins, thus having a substantially **H**-shaped cross-section. The upper outer faces of this yoke are provided with dovetail recesses *c*, forming seats or chairs for the tram-rails B, the outer wall of the recess being inclined, as shown at *d*, the metal of the yoke around said recesses being preferably increased, as shown, to add strength thereto. The tram-rails B are seated in said recesses, and are formed with a base having inclined sides, as shown, said bases being retained in their position within said recesses by means of the wedges C, one upon each side of the base of the rail. These wedges are of various thicknesses, and are designed to be interchangeable for the purpose of bringing the track to the desired gage.

At the inner ends of the upper face of the yoke, near the slot in which works the gripper, I form the recesses *e*, having inclined walls, as shown, and in these recesses are seated the slot-rails D, which are substantially **Z**-shaped in cross-section. In these recesses *e* upon the outer sides of the bases of the slot-rails, which are also preferably formed with inclined sides, are placed the wedges E.

The pulley over which runs the traction rope or wire is secured to the yoke within the gutter thereof in any suitable manner.

In practice the yokes are embedded in concrete or other analogous bed at suitable distances apart, the concrete or bed being extended to the point indicated by dotted lines. The lining-pieces F, preferably of wood, but they may be of thick sheet metal, corrugated or otherwise, are then placed in the position shown, either resting on the flange of the yoke and abutting at their ends against the webs of the adjacent yokes, or the webs may be provided with a slot adjacent to the inner flange, and the strips F passed through the said slots and extending the length of the distance between two or more yokes; but I prefer the former method, as by this means the strips serve in a measure to strengthen the yoke at this point. The lower ends of the strips in this instance will be supported by the concrete, but when the slots are employed the lower edges of the pieces F will rest upon the bottom wall of the slot, as will be readily understood.

The webs of the rails are perforated to receive the rods G, which connect the tram-rail on one side of the yoke with the slot-rail on the same side. These rods connect the bottom of the tram-rail with the top of the slot-rail, as shown, to better brace the parts and materially strengthen the same.

The rods G are provided with the nuts *f*, one upon each side of each rail, and between these nuts and the web of the rail are located the washers *g*, the sides of which adjacent to the rail are inclined so that the said washers will have a flat bearing on the web of the rail and the nuts a similar bearing on the washers. With this construction the rails (both tram and slot) may be readily brought to the proper gage, which is sometimes very difficult, owing to the uneven shrinking of the iron yoke casting when cooling.

What I claim as new is—

The combination, with the series of yokes provided with the flanges *b* and formed with seats for the slot-rails, of the concrete bottom, the slot-rails secured in said seats, and the lining-pieces between said concrete and slot-rails independent of said rails and supported by said flanges, substantially as described.

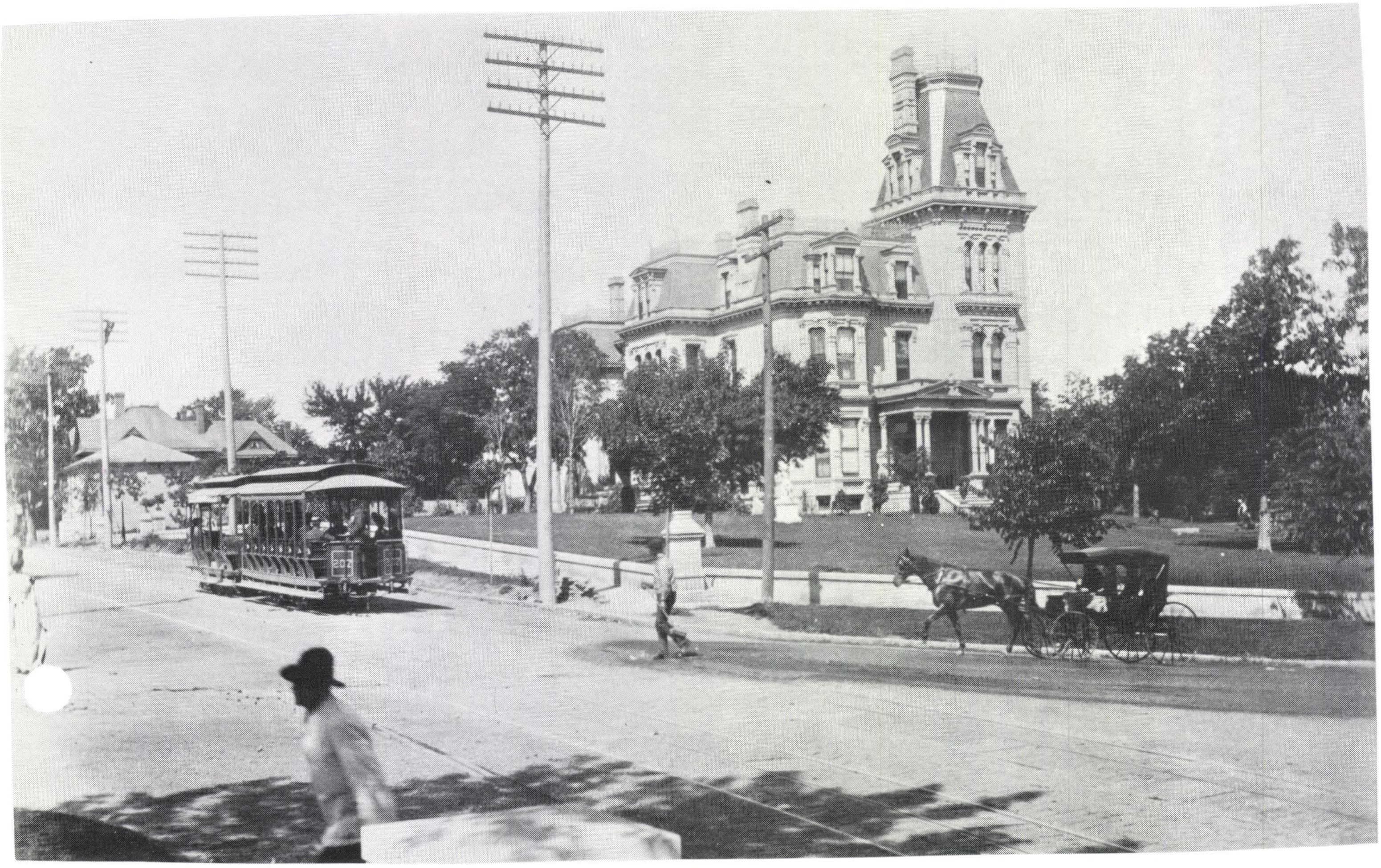
In testimony whereof I affix my signature, in presence of two witnesses, this 5th day of April, 1888.

PINCKNEY F. BARR.

Witnesses:
JAMES E. MACKHAM,
ALEXANDER E. HORN.

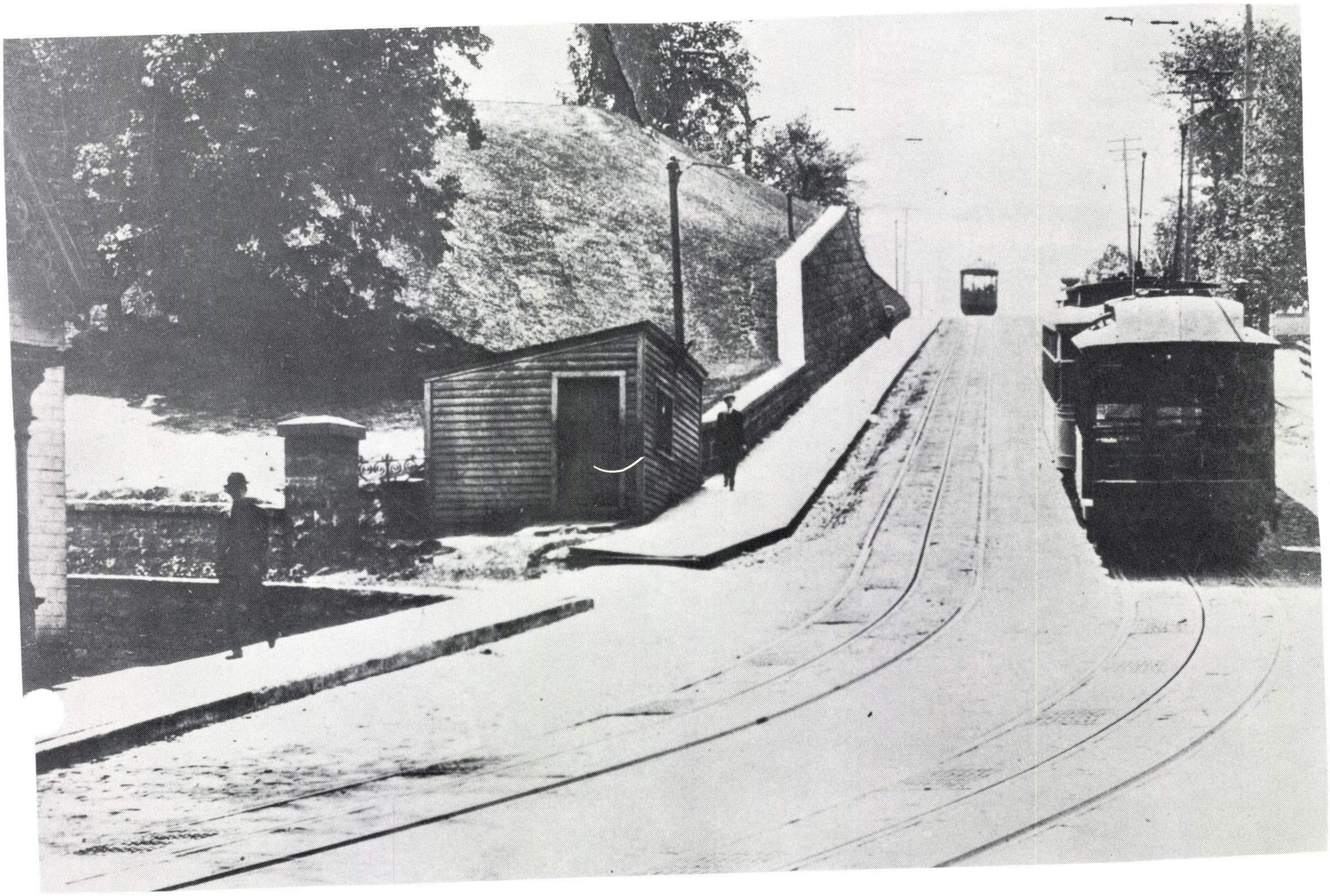
Selby Avenue Cable Line

Note what appears to be a four-bench open grip car pulling the eight-bench open trailer. The Trumbull 1-18-1893 Inspection Report does not include any mention of open grip cars shorter than six-bench (18 ft.).



Selby Hill Counterweight System

The small frame building in the center of the photograph is a brake house which contained a large flywheel connected by a shaft and gears to a roller-chain-driven mechanism located between the running and slot rails of the eastbound (descending) track. A drawing dated October 1892 indicates this was an emergency braking system installed on the original cable line.



TWO CABLE LINES
Minneapolis Tribune (1867-1908); Apr 11, 1889;
ProQuest Historical Newspapers Minneapolis Tribune (1867-1922)
pg. 1

TWO CABLE LINES.

They Are What Mr. Lowry Will Soon Build in Minneapolis.

It Is Expected That Work Will Begin This Month on a Trunk Line on Washington Avenue.

The Motor Line Will Be Replaced By Cable Cars That Will Run Every Five Minutes.

The Plant Will Cost Over $3,000,000—A Stree Car System That is Losing Money.

Minneapolis is to have two cable lines. The announcement comes direct from President Lowry, of the street railway company, and he expects that work on the new roads will begin this month, if a decision is reached next week in the St. Louis-Manitoba case, now before the supreme court in Washington. What will be a most pleasing surprise to the people of Minneapolis is the announcement that the motor line will not alone be replaced by a cable road, but that Washington avenue from Twentieth avenue north to Cedar avenue will be included in the cable system. If work begins as expected the new roads will be opened by Jan. 1. The cost of the plant will be over $3,000,000.

The time for the expiration of the steam franchise granted to the motor company is near at hand, and that fact, with the one that the street car company has lost money on the present system of street railways, have served to mature the plans for the cable project. Under the steam franchise a certain amount of work on a cable line to take the place of the motor system must be accomplished by November of this year. The company is prepared to carry out what is expected of them, and only await the decision mentioned. The putting in of the sewers on Nicollet avenue prevents immediate work on the cable road in certain sections, as the road could not be constructed until the sewers are extended from Twenty-ninth street to Thirty-first street. Last year sewers were put in from Twentieth street to Twenty-ninth street and it is proposed to complete from Twenty-ninth to Thirty-first this summer. Another hindrance is the lowering of the Hastings & Dakota tracks at Twenty-ninth street, but Mr. Lowry said the legislature would probably authorize the issuance by the city of $130,000 in bonds for the purpose, and that the tracks would probably be lowered very soon. The follow- details will be of interest:

The cable line will be put in on Washington avenue from Twentieth avenue north to Cedar avenue, and as the steam franchise for the motor expires Nov. 1, a cable line from Washington avenue, and very likely from the union depot, will be built to Thirty-first street, as soon as the sewers are put in from Twenty-ninth street to Thirty-first street. From Thirty-first the passengers will be carried to Minnehaha Falls, Washburn Home and the lakes, as they are now, by motor trains. The cable will follow the same streets now used by the motors according to present plans.

Cars which now run from one extreme terminus to the other on Washington avenue will be run to the terminus of the cable line, after its construction, and attached to the cable train and drawn to the proper junction on the Washington avenue trunk line. This will do away with about one-half the number of horses used on Washington avenue, and will give faster transportation. The passengers brought to the terminus of the cable at Thirty-first street by the motors, will be transferred, as it will be impossible to attach the motor cars to the cable trains.

The same cable system—the California—as is used in St. Paul will be put in. A number of valuable improvements have been made upon it since its introduction to the public, and it is considered one of the best now in use in the country. Perhaps a few changes in minor detail from the St. Paul cable will be made, but in outline the two will be similar. The cost of the cable will not be less than $3,100,000, but a definite estimate cannot be made as a number of details cannot be arranged until the work of putting in the cable is well under way. President Lowry and some of the other officials have spent considerable time in the East studying the cable systems in use. They have also examined Mr. Yorkers' system at Chicago, and looked over the lines in use at Kansas City and San Francisco, but the system used by the St. Paul City Railway seems to meet their impressions of what would best suit the situation in Minneapolis.

In putting in the system the power plant will be placed in a large building, one story in height above the basement. This building will contain all of the boilers and machinery, and is generally used as a store house for the cars. The engine will probably be from 500 to 800 horse power, with a drum wheel about 12 feet in diameter, and a drive wheel about 14.

The most important factor in maturing the plans for the cable is the fact that the street railway systems of the city must undergo a radical change, because, according to the books of the company, it is losing money, and the magnitude of the enterprise demands that it shall be upon a paying basis. There have been years since the car lines were established here in 1875 that the company balanced with a handsome profit, but the extensions have been so many, and the expense of manipulating the cars in those extensions so great, that the surplus of profitable years has been swallowed up, together with the large amount added to the capital stock.

The following is a statement taken from the books of the company yesterday, giving the expenses and profits of the entire system, leaving out the cost of extensions made during the year:

Earnings of the street railroad	$578,874.01
Earnings of the motor line	164,181.09
Total earnings	$743,055.10
Operating expense of street railroad	472,623.63
Operating expense of motor line	151,214.32
Total operating expenses	$623,837.95
Total earnings	743,055.10
Total operating expenditures	623,837.95
Net above expenditures	$119,217.15
For interest on street railroad bonds	72,844.67
For interest on motor bonds	45,280.17
Total	$118,124.84
Amount above expenditures	119,217.15
Amount paid in interest	118,124.84
Profit	$1,092.31

According to this statement, $1,092.31 is left to pay the expenses of building four miles of new track, $89,270.60, and defraying expenses of paving, $9,974.84. In addition to this there is the cost of new cars and purchase money for horses. Mr. Lowry said the actual loss of the street car company last year was $33,000.

The expenditures given in the statement consist only in repairs to cars, operating expenses, office expense, track repairs, pay roll, feed for horses, insurance and taxes, loss in horses, and general loss and damage. It is to be seen then that all extensions ordered by the city are paid for by issuing additional bonds, as the earnings of the car lines are insufficient. The office force is as small as possible, and the expense of clerk hire is about $12,000, greatly under the salary list of street car company offices in other cities equaling this in size. Mr. Lowry said yesterday that he had not drawn a dollar as salary from the organization, and always paid his traveling expenses while away on business for the company from his own purse.

Ex-Mayor Prince, of Boston, who held 1,000 shares, when shown the statement of last year's business, requested an offer for his stock. President Lowry arranged matters so that he was able to dispose of his shares, but not without some loss. Several other bondholders did the same thing. The fact is that while the company is supposed to be coining money it is not paying expenses, as the officers positively claim.

In addition to all other gloomy prospects the city has ordered the following additional list of sewers, covering a distance of sixty blocks. This simply means that the street car tracks will have to be taken up in the vicinities where the sewers are ordered laid, where they will not interfere with the work on the sewers, and after every piece of pipe has been laid put back in the middle of the street. This makes an additional outlay of the amount required to defray the expense of laying the track twice. Following is the list of sewers ordered:

	Blocks.
Sixth avenue north, from Fifth street to Oak Lake avenue	5
Sixth avenue north, from Lyndale avenue south to Girard avenue	6
Western avenue north, from Lyndale avenue to Irving avenue	9
Washington avenue, from Sixth avenue north to Tenth avenue north	5
Twentieth avenue north, from Washington avenue to James avenue	13
Nicollet avenue, from Twenty-ninth street to Thirty-first street	3
Fourth avenue south, from Sixth street to Seventh street	1
Fourth avenue south, from Sixth street to Fifteenth avenue	3
Chicago avenue, from Twenty-sixth to Twenty seventh streets	1
Sixteenth avenue south, from Seventh street to Franklin avenue	4
Bloomington avenue, from Franklin avenue to Twenty-fourth street	4
Washington avenue, from Fourteenth avenue north to Twentieth avenue north	6
Total number of blocks	60

In order to pay for the cost of these sewers more bonds must be issued, enlarging the amount of interest to be paid at the end of this year, thus greatly cutting down the small amount left over after paying the operating expenses of the company. In addition to this an extension of the Washington avenue car line is ordered to Shingle Creek, which necessitates the erection of an additional mile and one-half of track, beside the operating expenses, to accommodate, as the officials of the company say, perhaps a dozen people who come to Minneapolis once each day.

All of the above facts plainly demonstrate the necessity of a system of street travel which shall be less expensive, and it is from the cable line that relief is expected.

The merits of the cable over the motor are apparent. The accommodations of the cars in point of seating capacity and the smoothness of the motion are far superior to the motor, and the time is much better. The motor trains run now every 10 minutes, but the cable cars will pass each other every five minutes. It requires a large waste of time in stopping the motors and getting them under headway again, while the cables are almost under full stop when the break is applied, and again in full motion as soon as the grip is attached. The coal smoke, which is objectionable to the residents of streets upon which the motors run, is removed entirely by the cable. For convenience, rapidity and cleanliness the cable far exceeds all other systems of street railway traffic.

At present eight motors carry the passengers, though the company own 15 engines and a sufficient number of cars to make up 15 trains. When the cable is completed, beside making faster time, more cars will be run. Several of the street cars now in use can easily be used on the cable lines, so that the expense for car building will be greatly reduced. The engines now used between Washington avenue and the junction, will be held in reserve to be used between the end of the cable line and the three terminal points of the motor line. At just what time the citizens will be treated to a ride on the new line of cable cars cannot be mentioned, but it is not far distant. President Lowry, though perhaps well satisfied that every detail of the project will be properly carried out, will see that everything is properly arranged and will spare no pains to make the cable a success in every way. The effect the cable will have upon real estate in the vicinity will be exceedingly favorable to the owners.

Details of the working of a cable line will be of interest in this connection. In the engine room the compensation wheel is placed at the back of the engine, and the cable passes around the drum wheel to the compensation wheel. This wheel is a vast improvement over other systems, as, being set on an inclined plane; it keeps the cable taut by its weight, and, should the cable break, the engine would be automatically stopped by the compensation wheel, being forced to the end of the track.

The cable is composed of six strands of 16 wires each, protected by large wires wound about the outside. In the center of all is a hemp rope, which prevents chrystallization and lends elasticity to the cable. The wires are made of Suede steel, thus giving the cable a breaking tension of about 60 tons. Each night the cable is oiled and tarred to render the gripping easier, and to save wear by friction. The cable runs at the rate of about eight miles per hour and its breaking would be almost an impossibility Should it break it takes about 20 minutes to arrange it in its former condition. The cable passes through conduits beneath the track, around pulleys at each end of the line from about 10 to 12 feet in diameter, and instead o. being placed perpendicularly are horizontal The work of the pulleys is to guide the cable on the inside of the conduits. The great weight of the cable is sufficient to keep it upon the pulleys without pressure. In the case of a curve the grip lifts it from the pulleys as at any other time.

The grip is the connecting link between cable and car. It is hung in the center of the grip car, and extends through a continual slot in the track to grip the cable. When the grip grasps the cable it fastens with a pressure of 400 pounds to every pound applied, and the speed of the train is regulated by the tightening of the grip.

The grip car acts as the engine and is smaller than the others. The engineer stands in the middle of the car and is able to see everything before him. There are two levers with which he regulates the motion of the car, one opening and closing the grip and the other operating the brake. Small bells are fastened to the wheels of the car and sound as they turn. A large gong is attached overhead, which sounds as the train approaches crossings. The passenger cars resemble the present street cars somewhat, being larger and more comfortable. A strong wooden fender is placed about the wheels, so that it is impossible for unwary pedestrians to fall beneath them. Who will construct the cable line is not yet decided upon, but it is likely that those who superintended the building of the St. Paul line will have charge of this one.

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THE CITY
Minneapolis Tribune (1867-1908); Aug 16, 1889;
ProQuest Historical Newspapers Minneapolis Tribune (1867-1922)
pg. 5

THE CITY!

Plans for the Great Cable System Matured in Outline.

A "Loop" in the City's Center Forms a Common Terminus.

Transfers Made Easy—Enormous Statistics of Material.

Opening of the Norwegian Art Society Exhibition Last Night.

Architects and civil engineers are busily engaged in a large room recently made ready for them at the headquarters of the Minneapolis Street Railway Co., drafting the plans from which will be built the largest and most complete cable system the world has ever seen. The work is under the supervision of Chief Engineer Clift Wise, who planned the St. Paul and Kansas City systems of railway cables. The scheme of the system, which has occupied the attention of Thos Lowry and his associates for over a year, is to have a common terminus or center, by which all cars must pass so as to enable passengers to transfer from one line to another by simply changing cars, with the smallest possible inconvenience, and thereby reach any portion of the city the different lines penetrate, by paying but one fare. This will be accomplished by constructing a loop. This loop will be built on Washington avenue from Hennepin to First avenue south, traversing First avenue south to High street, along High street to Hennepin avenue and up Hennepin avenue to Washington avenue. This will take every car past the Union depot and also to the corner of Hennepin avenue and Washington avenue where passengers will be transferred. For instance, a passenger on Cedar avenue has for his objective point New Boston, he rides up Washington avenue as far as First avenue south at a rate of 10 miles an hour and as the cable reaches First avenue south the grip drops its own line and takes the loop at a speed decreased to six miles an hour and then goes just on First avenue south traversing the loop until the corner of Hennepin and Washington avenue is reached and here makes the transfer to a Hennepin avenue car at a ten-mile rate that carries the passenger direct to his destination, and the car he has just left again takes up its own line, going north on Washington avenue as far as Twentieth avenue.

The first lines will be built upon First avenue and Washington avenue and will make a total distance of 14 miles, including the loop. These lines will be ready for next summer's work, and the building of the Hennepin avenue and other lines will be completed, and the entire system in working order by the summer of 1891. When finished they will make a total of 27 miles of line—10 miles more than the Yerkes' system and about three miles more than the south side system in Chicago.

Bids are being received for the iron rails and other material to build the road and a communication received by Mr. Lowry from Engineer Wise gives a good idea of the quantity of material required. The communication is as follows:

MINNEAPOLIS, Aug. 15, 1889.—Thomas Lowry, Esq., President—Dear Sir: As per request, I herewith hand you approximate estimate of material that will be used, for which we are now asking bids on, for the First avenue South cable line, Washington avenue cable line and loop:

Girder rail	2,160,000 lbs.
Slot rail	2,320,000 "
Yokes and castings	8,000,000 "
Switch curves and special work	2,000,000 "
Driving machinery	500,000 "
2,000 cable carrying pulleys	50,000 "
28 10-foot diam. power sheaves	170,000 "
Total	16,200,000 lbs.

Brick for two power houses, 3,000,000.
Masonry, 6,000 cubic yards.
Oak lumber, 500,000 feet.
Pine lumber, 1,000,000 feet.
Crushed stone, 10,000 cubic yards.
Granite, 50,000 square yards.

The slot rail used in this work will be what is known as the "Barr slot rail," which is the best and heaviest steel slot rail used in the country. The girder rail is what is known as the "Providence girder rail," being seven inches in depth, which makes it stronger and more durable than any other rail used for street car purposes. All the iron if rolled into a telegraph wire would wrap itself around the globe (25,000 miles) 12½ times.

There will be a total of about 3,000 car loads of material used in this work, four Corliss engines of the most improved type will be used for driving the cables, with a total capacity of 3,000 horse power. Each engine will have a fly wheel of 24 feet diameter, weighing 60,000 pounds. Very truly yours,

CLIFT WISE, Engineer.

"The one great feature," said Mr. Lowry, "that will make the Minneapolis cable system superior to any other street railway system in the world, is the loop and transferring accommodation at Hennepin and Washington avenues. It would be a geographical impossibility to establish so convenient and serviceable a system in either St. Paul or Kansas City, and I know of no other city where a similar arrangement could be perfected."

Mr. Wise is also highly pleased with the result of his labors. The loop is the keystone that solved the mystery, and a smile of self-approbation brightens his countenance whenever he hears the word "loop."

Besides the cable system in the city it is the intention of the company to construct a cable line from Minneapolis to St. Paul at an early date. If an entrance can be secured into St. Paul work on the road will begin at once, and the fare for the trip of about 11 miles will be one dime. If this road is constructed, and it is the intention of Mr. Lowry that it shall be, it will be the means of connecting the cable systems of the twin cities.

Work on the streets will be in full blast by fall and give employment during the entire winter and spring to about 3,000 men. There will two or three power houses to build and get in readiness for the mammoth machinery that is to move the rolling stock. The present headquarters at the corner of Second street and Third avenue north will be remodeled into the principal "motor shops," but the location of the others has not as yet been definitely decided upon.

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Mileage of American Street and Rapid Transit Cable Railways 1873-1913

Year	Miles built	Miles in service	Miles converted or abandoned
1873	0.6	0.6	. . .
1874	. . .	0.6	. . .
1875	. . .	0.6	. . .
1876	. . .	0.6	. . .
1877	1.5	2.1	. . .
1878	2.5	4.6	. . .
1879	2.4	7.0	. . .
1880	4.2	11.2	. . .
1881	. . .	11.2	. . .
1882	9.1	20.3	. . .
1883	10.8	31.1	. . .
1884	. . .	31.1	. . .
1885	15.4	46.5	. . .
1886	15.8	62.3	. . .
1887	32.2	93.0	1.5
1888	59.3	151.4	0.9
1889	66.1	213.8	3.7
1890	54.3	266.4	1.7
1891	21.9	272.3	16.0
1892	22.4	287.6	7.1
1893	28.2	305.1	10.7
1894	6.8	302.3	9.6
1895	7.5	289.5	20.3
1896	. . .	255.7	33.8
1897	. . .	241.7	14.0
1898	. . .	220.2	21.5
1899	. . .	183.8	36.4
1900	. . .	147.9	35.9
1901	. . .	120.3	27.6
1902	0.4	108.4	12.3
1903	. . .	101.4	7.0
1904	. . .	95.3	6.1
1905	. . .	95.3	. . .
1906	. . .	29.3	66.0
1907	. . .	29.3	. . .
1908	. . .	28.2	1.1
1909	. . .	27.7	0.5
1910	. . .	25.9	1.8
1911	. . .	25.0	0.9
1912	. . .	21.0	4.0
1913	0.3	20.0	1.3

Mileages are miles of double track or equivalent. A single-track line with traffic in both directions is treated as double track, but a single track in one direction only is treated as half of double track.

Source: Corporate histories in Part II.

In July 1888 the SRJ reported that the company had temporarily postponed the Harvard Square line in response to pressure from the Cambridge City Council to use an overhead electric system. In the August issue Whitney was reported in Richmond inspecting the Sprague electrification, and the Cambridge line was said to be set aside for the year, if not permanently. Cummings' investigation of the corporate records indicates Whitney had decided upon electrification as early as June, 1888. As far as is known, no actual construction of the cable lines had been undertaken when Whitney's famous decision was made.

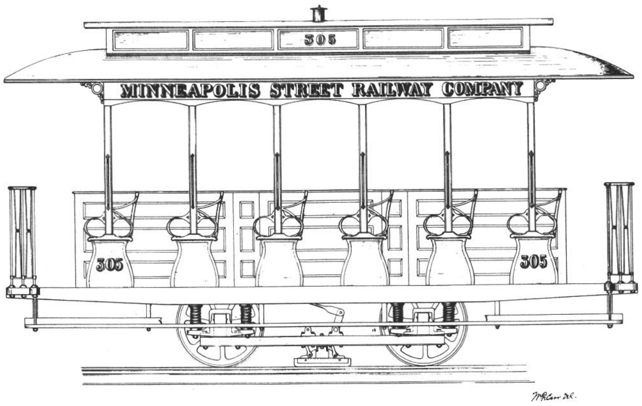
Minneapolis

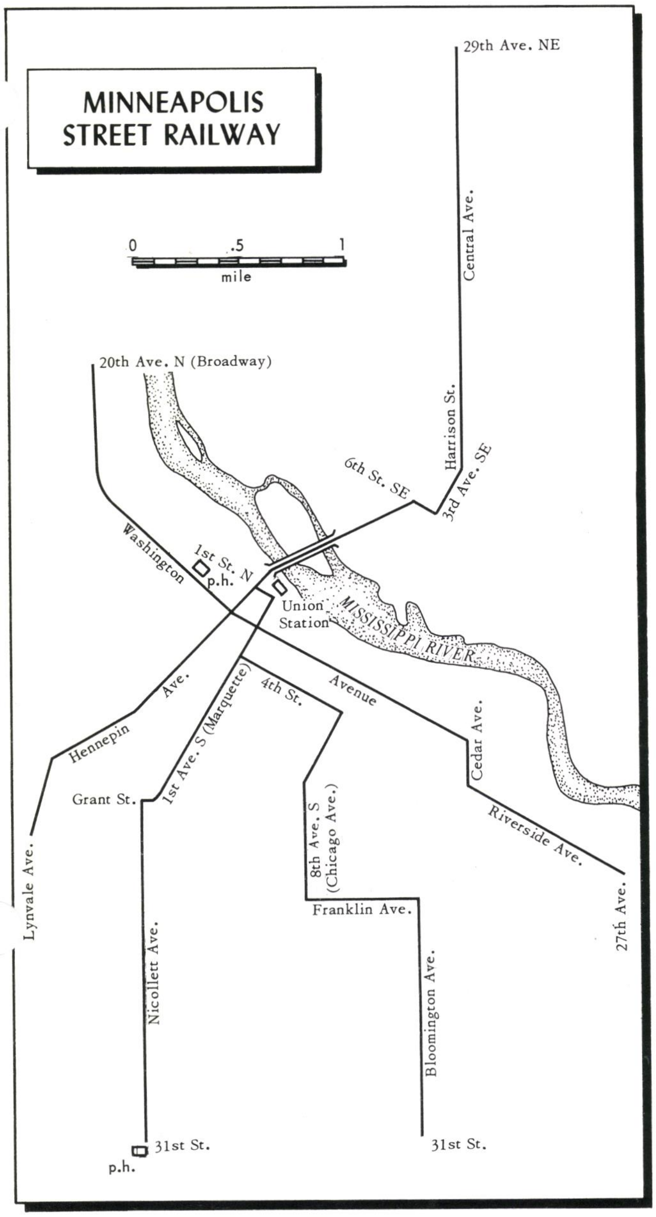
Population in 1890: 164,738

MINNEAPOLIS STREET RAILWAY

As in most other respects, Minneapolis is dissimilar to St. Paul in terrain. The city is mainly flat or gently undulating, with no marked difference in altitude between the central business district and the dormitory areas. It shares, of course, St. Paul's fierce climate, and thus the street railway had a double incentive to avoid cable traction. The Twin Cities' street railways had come under the common control of Thomas Lowry, President of the Soo Line, in 1886. A joint committee of the city councils of the two cities had inspected the street railways of Cleveland, Baltimore, Richmond, Boston, New York, and Philadelphia, and had concluded in favor of cable, relative to electric railways. Owing to St. Paul's physical characteristics, Lowry was willing to lay cable there, but he was reluctant to do so in Minneapolis. In 1889, with a conspicuous show of dissatisfaction, he agreed to the Minneapolis City Council's directive, and under-

Plans of the stillborn Minneapolis system progressed through design of the grip cars. *(Russell Olson)*



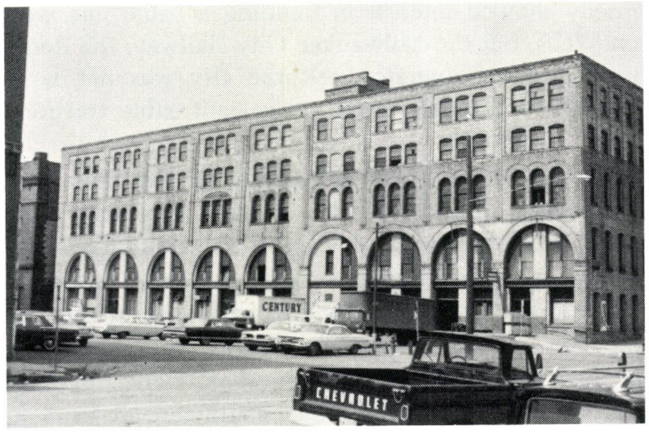

MINNEAPOLIS STREET RAILWAY
0
.5
1
mile
29th Ave. NE
Central Ave.
20th Ave. N (Broadway)
Harrison St.
6th St. SE
3rd Ave. SE
Washington
1st St. N
p.h.
Union Station
MISSISSIPPI RIVER
Ave.
Hennepin
1st Ave. S (Marquette)
4th St.
Avenue
Cedar Ave.
Grant St.
8th Ave. S (Chicago Ave.)
Riverside Ave.
Lynvale Ave.
Franklin Ave.
27th Ave.
Nicollett Ave.
Bloomington Ave.
31st St.
p.h.
31st St.

took construction. Plans were developed by Clift Wise, who presumably intended to use the same technology as in St. Paul.

The system would have been a large one, 14 miles at the outset and 21 miles by 1891. As the accompanying map indicates, it was to be radial from the central business district to all of the densely populated areas of the city. The system was to be centered in a powerhouse at 2nd Street and 3rd Avenue North, which was to issue two cables each (through conduits) for the Washington Avenue and Hennepin-Central Avenue lines. The Nicollet Avenue line was to be run from a separate powerhouse at its 31st Street terminus. A similar arrangement was presumably envisioned for the Bloomington Avenue line, which was to be part of the second stage of construction. The central powerhouse was also to issue a low-speed cable for a downtown loop over which all cars would move counterclockwise past Union Station. Relative to cable lines elsewhere, it was a well-conceived system, which apart from climatic impediments, would probably have been fairly easy to operate.

In the second half of 1889 the company built the two powerhouses and did a small amount of excavation for construction along the Nicollet Avenue line at Grant Street. Nicollet was occupied by an existing motor line of the company, and would doubtless have been the route of heaviest traffic. The company bought about $400,000 worth of equipment for the powerhouses and conduits, which it stored in three locations.

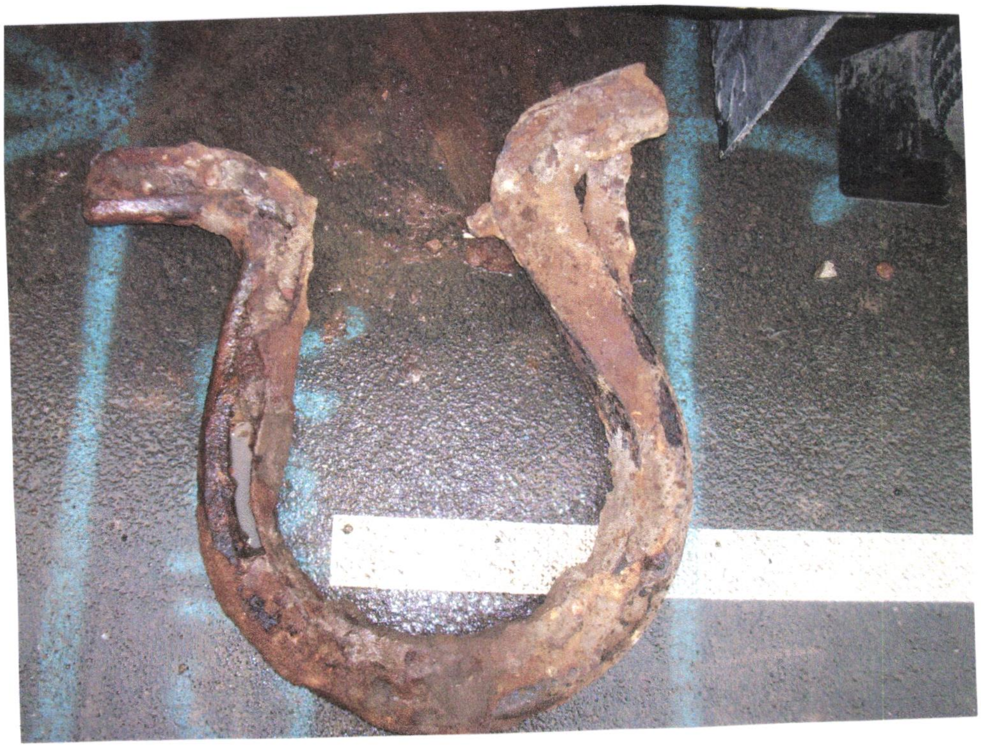
Meanwhile, the Minneapolis Street Railway opened its first electric line on 4th Avenue on December 4, 1889, and was highly pleased with its operation in the winter weather, relative to the St. Paul cable lines. Lowry quickly moved to convert his franchise to electric. The Minneapolis *Tribune* was a strong advocate of an electric system for the city; on January 11, 1890, it wrote: "The fact is that except for hills, nobody regards cables as the ultimate solution of the local transit problem. The cable system is extremely expensive, and it is a cumbrous, awkward method of locomotion that is bound to be superseded." The City Council granted permission for the system to be built as electric on August 8, 1890, by a vote of 30-0, and Lowry quickly complied. The cable machinery was sold as scrap, though both powerhouses were completed as part of the electric system.


CENTURY
CHEVROLET

A cable powerhouse which never issued a rope, the intended central power station of the Minneapolis lines survives as the Colonial Warehouse. *(Byron D. Olsen)*

Selby Avenue Cable Line
Conduit Yokes

In October 2009 utility relocation work on E. 4th St. uncovered the partial remains of a cable yoke. See the photograph. There are no inch markings visible on the straight edge so it is difficult to determine if this is just the upper part of a yoke, or a partially complete different style of yoke. See the drawing for what a complete yoke of this style might look like.



TEST OF CABLE RAILWAY YOKE, ST. LOUIS CABLE & WESTERN RAILWAY.

Load lbs.	Deflection. Inches.	Permanent Deflection. Inches.
200	.05	....
500	.115	....
800	.185	....
4000	1.01	.16
4800	2.13	....

Compression applied as indicated by arrows in sketch. Distance A measured and its diminution called Deflection. Weight of rail, knee castings, and chairs, 241 lbs.

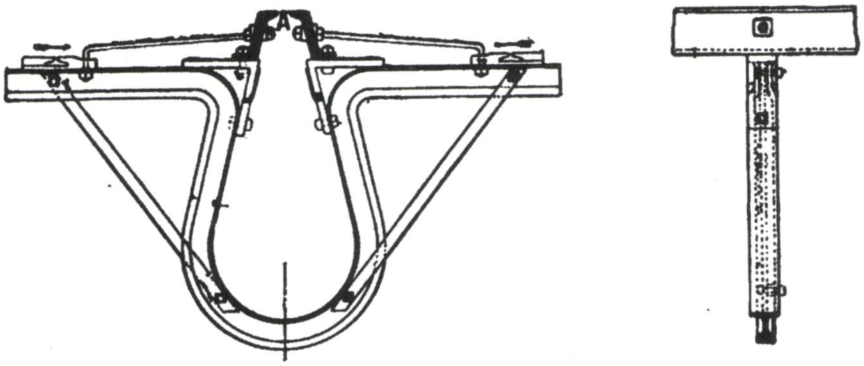
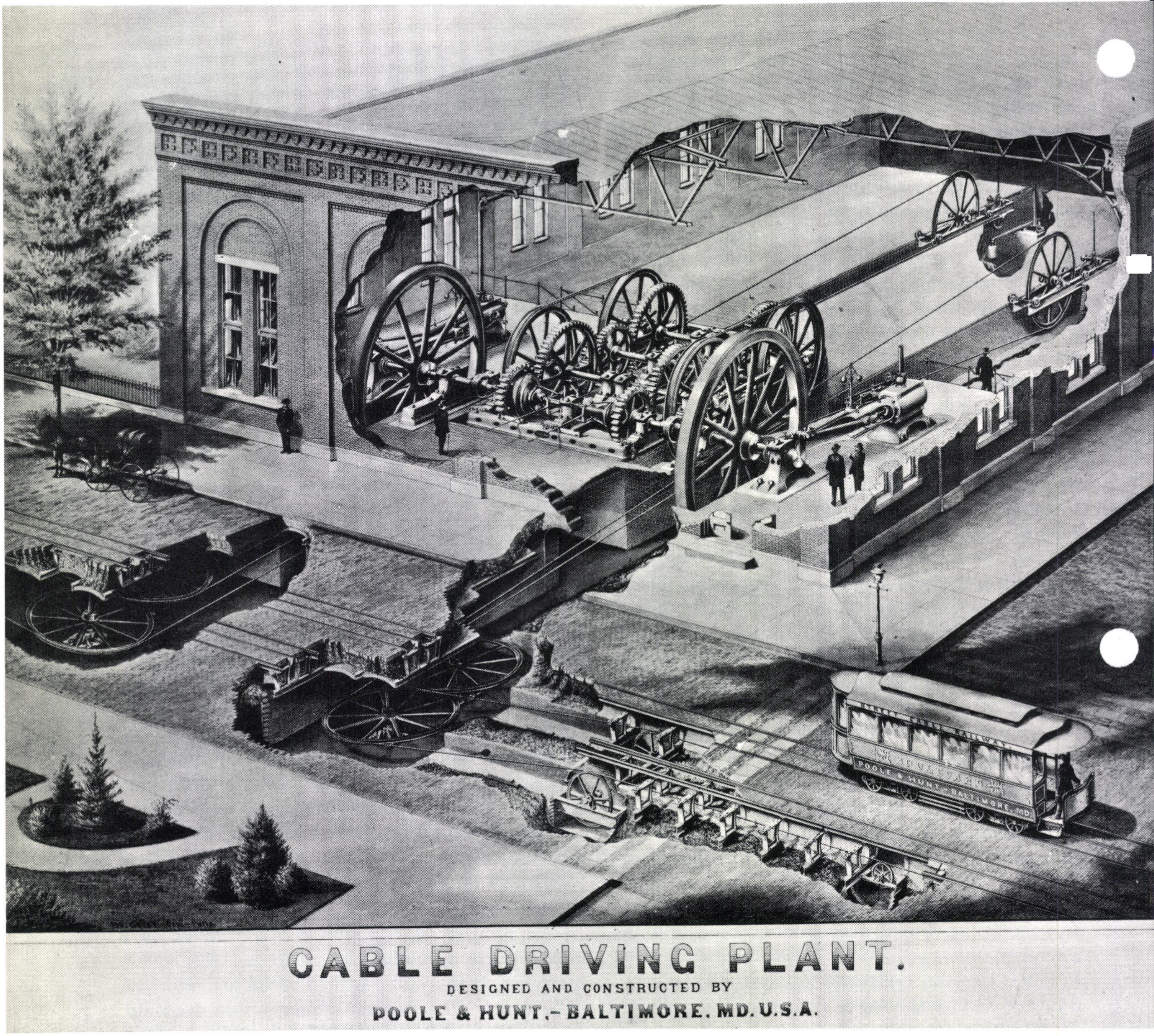


Fig. 153.—St. Louis Cab el & Western Line.


CABLE DRIVING PLANT.
DESIGNED AND CONSTRUCTED BY
POOLE & HUNT.–BALTIMORE. MD. U.S.A.
POOLE & HUNT – BALTIMORE, MD.

For an advertisement Poole & Hunt had commercial artist P. F. Goist delineate a typical powerhouse issuing two ropes. Goist did a fine job, presenting one of the best encapsulations of cable traction ever attempted. The powerhouse has two horizontal single-cylinder engines, either of which could power both cables. The cable being held by the car in the foreground feeds in under a powered idler, and makes two wraps around the driver and idler before going on the tension run to the sheave in the right background. As on most tension runs, the cable feeds from below and returns to the conduit from the top of the sheave. As far as is known, the lithograph shows a hypothetical representative powerhouse, rather than any actual structure. *(Smithsonian Institution)* driven with power derived from the cable by means of friction gear which is set in motion by a hand lever. Another hand lever serves to set the table in motion by means of friction gear, as before noted.

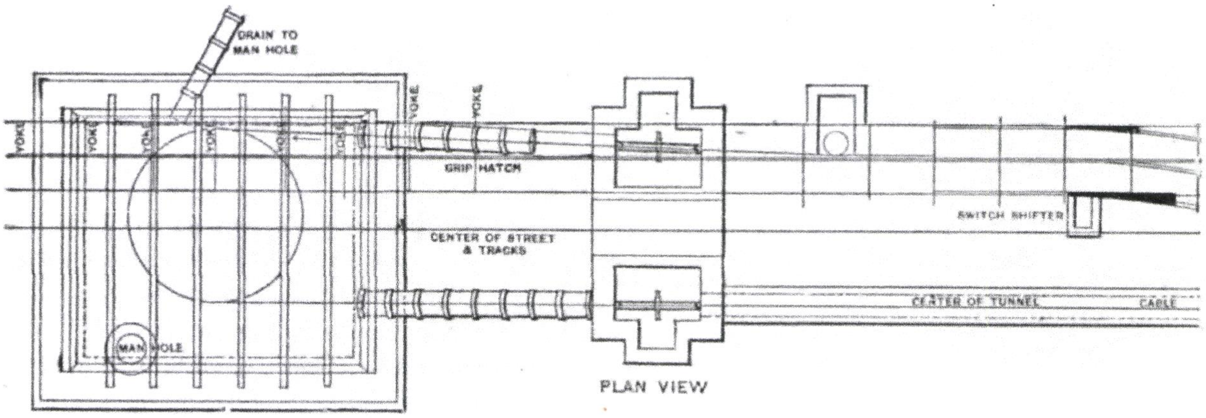

DRAIN TO MAN HOLE
YOKE
YOKE
YOKE
YOKE
YOKE
YOKE
YOKE
YOKE
GRIP HATCH
CENTER OF STREET & TRACKS
SWITCH SHIFTER
CENTER OF TUNNEL
CABLE
MAN HOLE
PLAN VIEW

FIG. 196.—TERMINAL SHEAVE AND PIT.

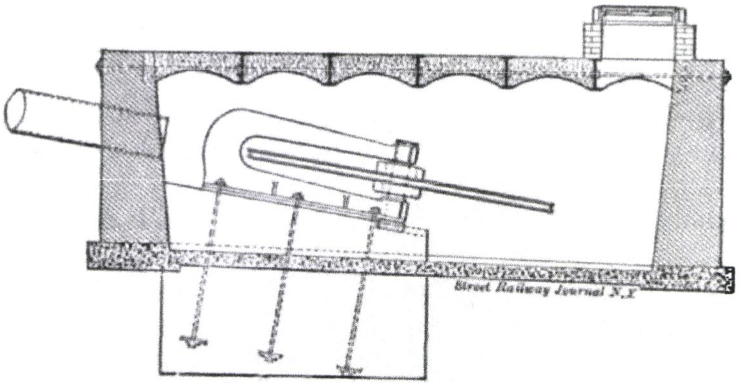

Street Railway Journal N.Y

FIG. 197.—TERMINAL SHEAVE.

In order to provide for the dispatch of cars in rapid succession the turntable may be provided with two sets of tracks so disposed that when one car is turned and headed for its return track the other set of tracks on the table is in position to receive another incoming car from the main track. Two or more outgoing tracks or special sideways may also be provided, which converge into the main line at a suitable distance and thus facilitate the dispatch of cars. This is a valuable feature, especially where the cars of various lines have a common terminal. In some cases both switches and hand turntables are provided at the terminals. The ideal terminal, however, is the loop which provides for turning cars or trains of any length quickly, without special attendants. The loop may be operated at full speed by the main cable, or an auxiliary cable may be provided, which is operated at a slower speed by means of gears and drums driven from the main cable. When the loop is in the vicinity of the power house the auxiliary cable may be driven by special machinery in the power house and conducted to the curve through a blind conduit.

While the loop is the ideal method for turning cars it is expensive in first cost, absorbs power and is very hard on the rope. Other things being equal a cable line should be so designed that the rope will be required to do the least possible work. Curves, loops and auxiliary machinery should, if possible, be avoided.

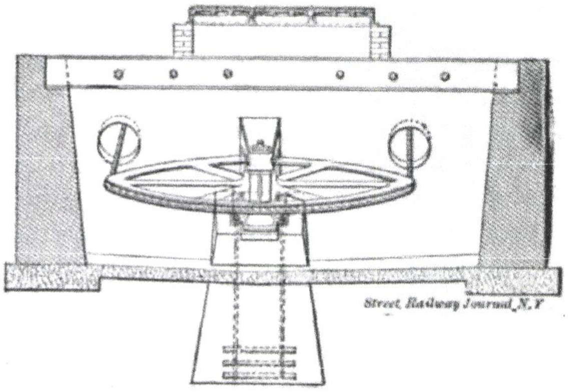
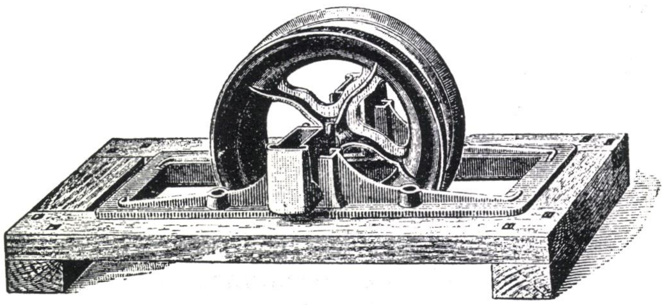
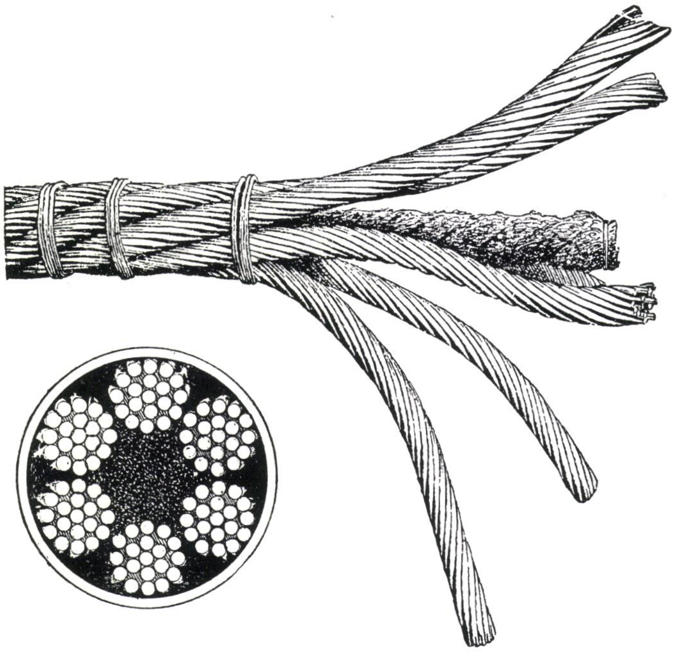

Street Railway Journal N.Y

FIG. 197A.—TERMINAL SHEAVE.

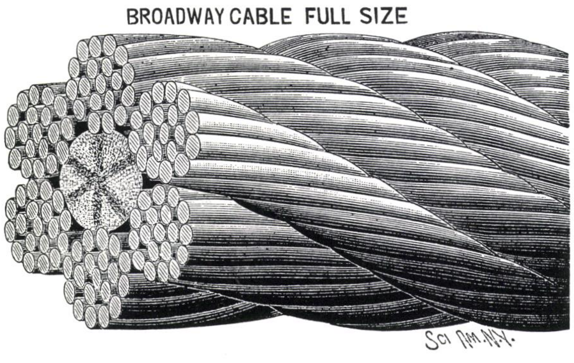
Digitized by Google

The basic wheel in the conduit was the carrying pulley. The frequency of carrying pulleys varied from 30 to 40 feet, but the Chicago City Railway, the Philadelphia Traction Company and most other operators found 32 feet the optimal interval. It was generally felt that ideally a moving cable should be absolutely horizontal, but this was impossible; a 32-foot interval of carrying pulleys was optimal for reconciliation of minimization of investment in facilities and minimization of the catenary of the cable. The pulley itself was a broad-faced wheel of 9 to 24 inches in diameter, depending on the space available and on resistance to revolution of the pulley. Augustine Wright stated that, with a given 1-inch journal, a 12-inch wheel required two pounds of force to turn it, but a 24-inch wheel required only one pound. On the other hand, with a pound's pressure of mud or ice against the wheel, a 12-inch pulley would turn, but a 24-inch would not. In 1887 the Chicago City Railway out of this consideration shifted from 16-inch to 12-inch pulleys. The face of the pulley was three or four inches wide, depressed in the center to hold the cable. Since the cable lay lightly on the pulley, most roads used ordinary cast iron, though a minority used a harder facing such as chilled steel.

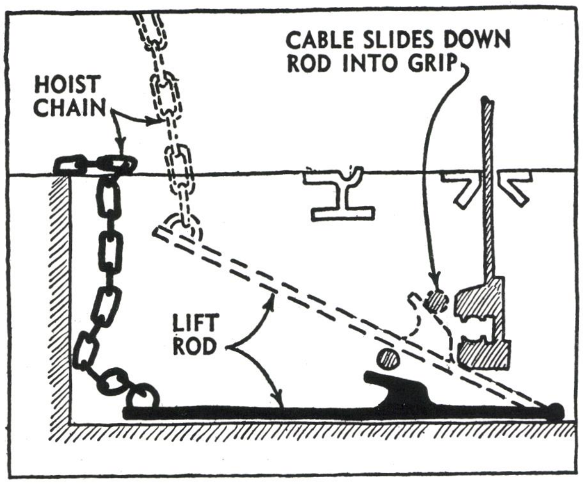


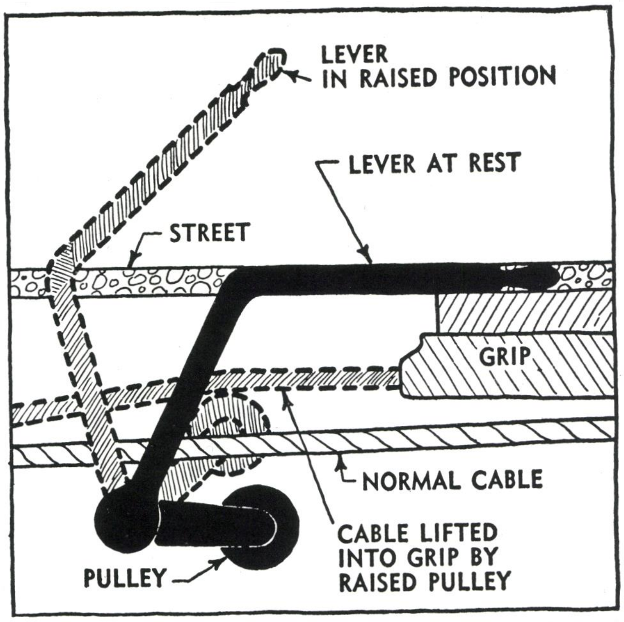


William H. Searles in 1887 estimated that an average cable would run from 85,000 to 100,000 miles over the course of 12 to 14 months, and lose 10 per cent of its weight but 40 per cent of its strength. Since he estimated the breaking strain of a new cable at 39 tons, a cable had a safety factor of three or four even when old. Others estimated the breaking strain as high as 45 tons. The Chicago City estimated a 1¼-inch cable lost about 3⁄16 inches in diameter over its lifetime. The Vine Street line in Cincinnati found an 18-ton cable lost 1½ tons in weight and 1⁄16 in diameter in an average life of seven to eight months. Fairchild in 1892 estimated that the average life of cable for the industry was eight months and that mileage normally ranged from 40,000 to 150,000.



At the top is an ordinary lay cable, separated to show its construction. Note that the six strands are wound around the hemp core to the left, but the wires are wound in each strand to the right around one another. The cross section shows such a rope of six strands of 19 wires each.


CABLE SLIDES DOWN ROD INTO GRIP
HOIST CHAIN
LIFT ROD


LEVER IN RAISED POSITION
LEVER AT REST
STREET
GRIP
NORMAL CABLE
CABLE LIFTED INTO GRIP BY RAISED PULLEY
PULLEY

SELBY HILL COUNTERWEIGHT SYSTEM

Frank Trumbull, on his second inspection visit in 1894, had advocated conversion of the "Selby Avenue" cable line to electric operation with the exception of the portion on Selby Hill itself. Presumably the company's financial problems prevented this from being done at that time. As conditions improved plans for the conversion were developed.

The "Selby Avenue" cable line was electrified from downtown St.Paul to to Chatsworth St. during 1898 except for the installation of a modern counterweight system on Selby Hill to overcome the 16% grade.Cable cars ceased running June 3, 1898. The first electric car ascended Selby Hill on the new counterweight system August 3, 1898.

The counterweight system was designed by Milton H. Bronsdon of the Providence, Rhode Island, Cable Tramway. The construction drawings are titled Bronsdon's Compound Counterweight System For Selby Hill, St.Paul, Minn. Each track was equipped with its individual counterweight unit so that cars could both ascend and descend on each track independently. One track was designated as Line A and the other track as Line B. To facilitate flexibility two scissors crossovers were installed, one west of Selby and Summit Avenues, and the other east of W. 3rd St. and Pleasant Ave.

The underground construction on **each track** involved an Upper Terminal (at Selby and Summit), a Middle Terminal (where the east portal of the Selby Tunnel is now), and a Lower Terminal (at 3rd and Pleasant). Specially designed yokes installed between the Upper and Middle Terminals contained the conduit and pulleys for the cable as well as forming the tunnel framing in which the counterweight unit ran. The cable and grip operated in the upper conduit while the counterweight unit operated in the lower conduit or tunnel. Each Upper Terminal consisted of a grip stop, terminal sheaves for the cable, and a buffer (a timber mounted on coil springs). Each Middle Terminal consisted of terminal sheaves for the cable, a tension weight and pit for same (for keeping the cable taut), and a buffer. The distance between the Upper and Middle Terminal buffers was 483.5 feet.

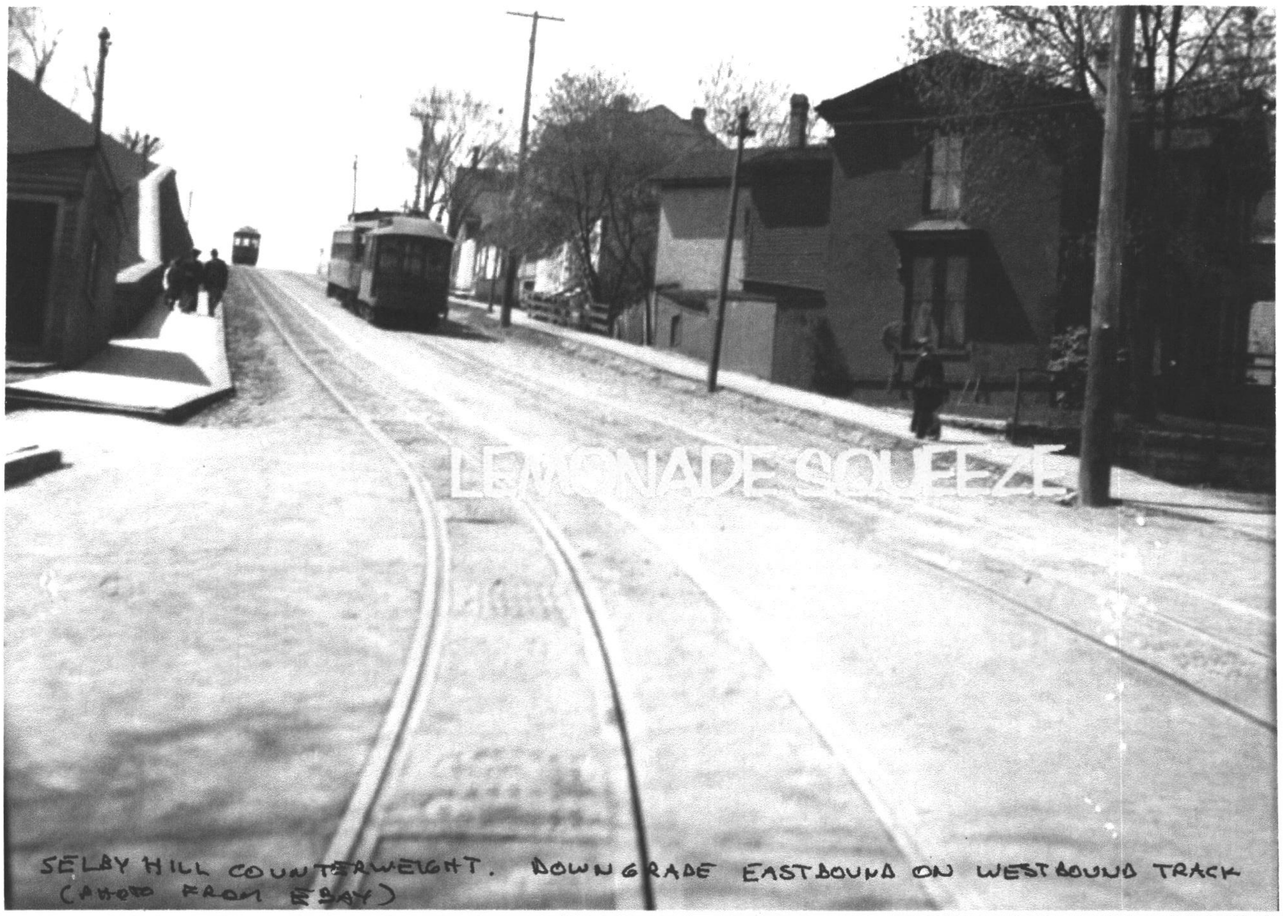
Yokes installed between the Middle and Lower Terminals formed the conduit for the cable and contained the sheaves and pulleys for the cable. Each Lower Terminal consisted of terminal sheaves for the cable and a grip release device at the end of the slot rail. There was a 199.7 ft. radius double track curve between the Middle and Lower Terminals which further complicated the construction. Each counterweight unit ran only between the Upper and Middle Terminal.

The grips were attached permanently to the cables by means of clamps secured by bolts. At the top of each grip was an automatic gripping device. Each grip car was equipped with a grip blade which could be automatically attached to or released from the grip itself by the grip release device in each Lower Terminal.

With the counterweight unit at the Middle Terminal and the grip at the Upper Terminal, 1 1/8" diameter cable led as follows. One end was permanently fastened to a beam in the upper end of the Upper Terminal, then to and around the 48" diameter sheave set in the lower counterweight section, back to the

Upper Terminal and around a 60" diameter sheave set an angle of 75 degrees which placed the cable in the upper conduit where the grip was attached. From there it led through the conduit, passing through the Middle Terminal and down to the Lower Terminal. After passing around sheaves in the Lower Terminal it returned in the conduit back to the Middle Terminal where it was diverged downward by other sheaves into the counterweight tunnel, then to and around the 48" diameter horizontal sheave set in the upper counterweight section. It then led back a short distance down grade to and around a 24" diameter sheave and down to a connection with the 2,200 pound tension weight at the bottom of a 13 ft. well, all in the Middle Terminal.

A grip car, electrically operated (traction motors and overhead trolley), ran on each track, "pushing" regular cars up the hill (the regular cars also used their traction motors to assist in the process), and leading them down the hill. The special function of the grip car was to engage the grip on the cable by means of its grip blade and then by setting the cable in motion, cause the counterweight unit to operate, balancing the weight of the grip car and regular car. While a counterweight unit operated only between the Upper and Middle Terminals, a grip car was attached to and under the control of the cable the entire distance between the Upper and Lower Terminals.


LEMONADE SQUEEZE

SELBY HILL COUNTERWEIGHT. DOWNGRADE EASTBOUND ON WESTBOUND TRACK
(PHOTO FROM EBAY)

COUNTERWEIGHT SYSTEM IN ST. PAUL.

St. Anthony Hill in St. Paul is one of the choicest residence districts of the city, and the hilltop view up and down the Mississippi and across its valley is one never to be forgotten. One of the principal means of access, because the most direct, is via Selby avenue, which by a more circuitous route attains the elevation of over 100 ft. which along the river bank only a few hundred feet away rises in a sandstone cliff almost as smooth and straight as a wall.

It has always been difficult of access, and much as transportation was desired the horse car never ventured its ascent. When cable construction was introduced it was gladly seized upon as a solution of the problem, and operation has been very successful with the one exception of the runaway accident about 10 years ago, which cost the company $180,000. The company has for a long time been extremely anxious to standardize its motive power, and operate entirely by electricity, and but for this short hill section would have done so long ago. For two or three years past all kinds of devices have been presented and rejected, and it was not until the Bronsdon system—invented by M. H. Bronsdon, chief engineer of the Union Railroad, Providence—was brought out, that the way seemed clear to take out the cable. The construction work is progressing nicely, and when completed electric cars with heaviest loads will travel the grade in either direction in perfect safety and at a good rate of speed. The improvement is one most needed in the St. Paul system; and company and citizens alike are to be congratulated on the change.

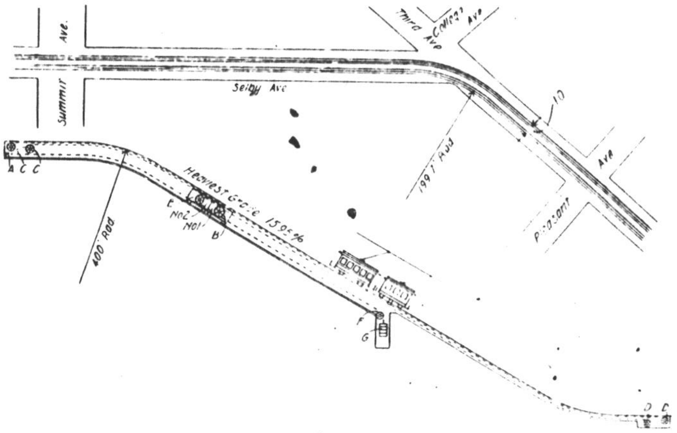


FIG. 1—DIAGRAM OF GENERAL ARRANGEMENT.

The term, compound, used in connection with this particular system refers to the manner of arranging the cable, as will be explained later, the object being to have the weights travel but one-half the distance traveled by the car. The counterweight system is to replace that part of the cable railway now in operation known as Selby Hill, while the entire road is to be equipped with electricity. Cars weighing from 15,000 lbs. to 30,400 lbs. will be operated on a two-minute headway. A grip car will be used to move the passenger cars both up and down the hill. When in operation, the grip car will always be on the lower end of passenger car when on the grade; i. e., the grip car will be behind the passenger cars while ascending, and ahead of passenger cars while descending the grade. The object of this is, that in case the draw bars between the grip and passenger cars should become inoperative, the passenger car cannot run back down the grade, but will be obstructed by the grip car. The use of the grip car removes the necessity of placing special attachments upon the passenger cars and a car of any weight may be moved over the grade by its use. The grade begins at the foot of the hill with a rising grade of 5.01 per cent and increases gradually to 15.95 per cent to the summit, where it falls to 3.66 per cent. Part way up the grade is a horizontal curve of 199.7 ft. radius. This horizontal curve, extending as it does into the rising grade (or more properly termed the vertical curve), complicates the engineering difficulties in the design of this work. Cable railway engineers will readily understand the difficulty of passing a cable through a horizontal and vertical curve at the same time. To accomplish this, the vertical curve was made parabolic and extended down into the horizontal curve, the lower tangent point of the vertical curve coming near the apex of the horizontal curve. The general arrangement will be about the same as the system in operation at Providence, R. I., which was described in the REVIEW for April, 1896, the only difference being that no draw bar is to be used to connect the counterweights.

Practically all the delays and mishaps of counterweight systems have been caused by the failure of the cable fastenings and counterweight draw bar connections. This does not apply to the "compound system" alone, but to any of the systems of counterweights. As mentioned above, no draw bars are to be used to hold the weights together but the cable is used instead. By referring to Fig. 1 it will be seen that the cable is lapped by itself, extending from the top of the incline down to the counterweight lowest on the grade. The cable, therefore, pulls the weight designated as No. 1 and this weight pushes No. 2 before it. Also, the tension of the cable serves to hold the counterweights together. As will be seen, the cable is fastened at A and passes down the tunnel to weight No. 1 (passing by weight No. 2), around the sheave placed in weight No. 1 and back up the hill to and around the sheaves C, C, at the upper terminal, thence down the entire length of the hill, to and around the sheaves D, D, set at the lower terminal, back up the hill to weight No. 2 (passing by weight No. 1), to and around a sheave set therein, and back to and over the tension sheave where it is fastened to a tension weight in a pit. It will readily be seen, therefore, that (by this arrangement of the cable and counterweights) no draw bar connection is needed to hold the counterweights together. It must be understood that Fig. 1 is not taken from the working drawing but is simply a diagram to show the manner of laying the cable and counterweights.

Reference to the general plan, Fig. 2, will make clear the arrangement of the tracks in general, with the crossovers at either end, and also show the grades and curves. The track rails are to be Johnson 5-in., 80-lb. T, except on the horizontal curve where Johnson 6-in., 92-lb. guard rails will be used; the slot rails are Johnson 7-in., 70-lb. Z-bars. The rails in the conduit for the counterweight are also 5-in., 80-lb. T. All the special work is the Johnson "guarantee."

As explained before, the counterweights move over but one-half the distance that the car moves, and hence the different portions of the conduit differ in construction. On the upper portion, where a track must be provided for the counterweight, the section is as shown in Fig. 3 (a section on E, E, Fig. 2), which shows the construction, with the yokes,

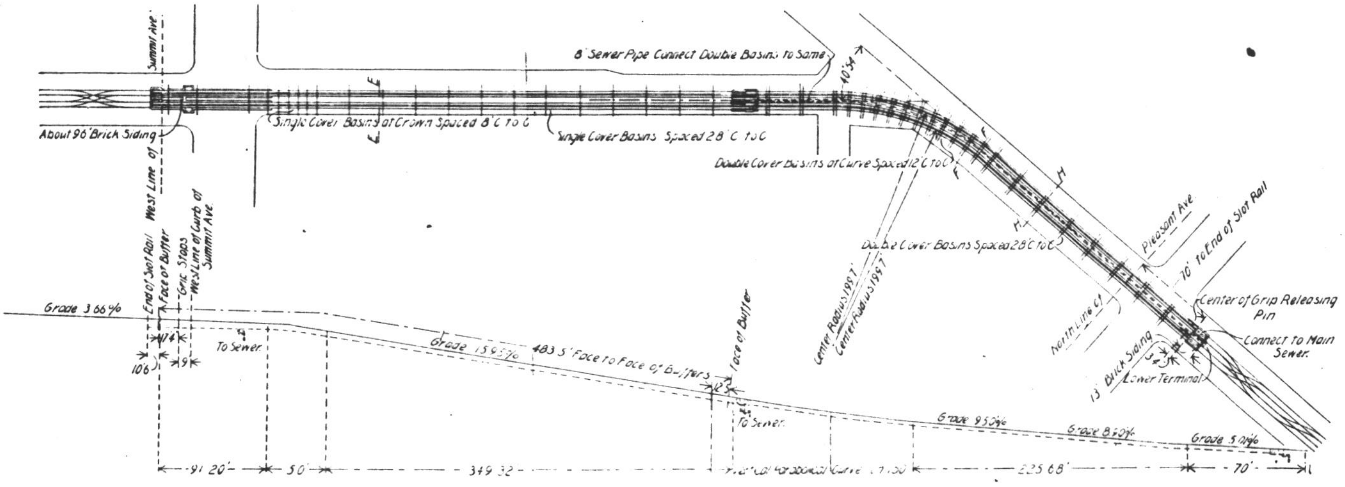

8" Sewer Pipe Connect Double Basins to Same
Summit Ave.
About 96' Brick Siding
Single Cover Basins at Crown Spaced 8' C to C
Single Cover Basins Spaced 28' C to C
Double Cover Basins at Curve Spaced 12' C to C
Double Cover Basins Spaced 28' C to C
40'54
E
E
F
F
H
H
Pleasant Ave.
70' to End of Slot Rail
Center of Grip Releasing Pin
Connect to Main Sewer.
North Line of
13' Brick Siding
Lower Terminal
Center Radius 198'
Center Radius 199'
West Line of
End of Slot Rail
Face of Buffer
Grip Stops
West Line of Curb of Summit Ave.
Grade 3 66%
To Sewer.
Grade 15 95%
483 5' Face to Face of Buffers
Face of Buffer
To Sewer.
Grade 9 50%
Grade 8 60%
Grade 5 11%
10'6
17'4
9'
12'5
91 20'
50'
349 32
Vertical Parabolical Curve
225 68'
70'

FIG. 2—PLAN AND PROFILE OF SELBY HILL LINE.

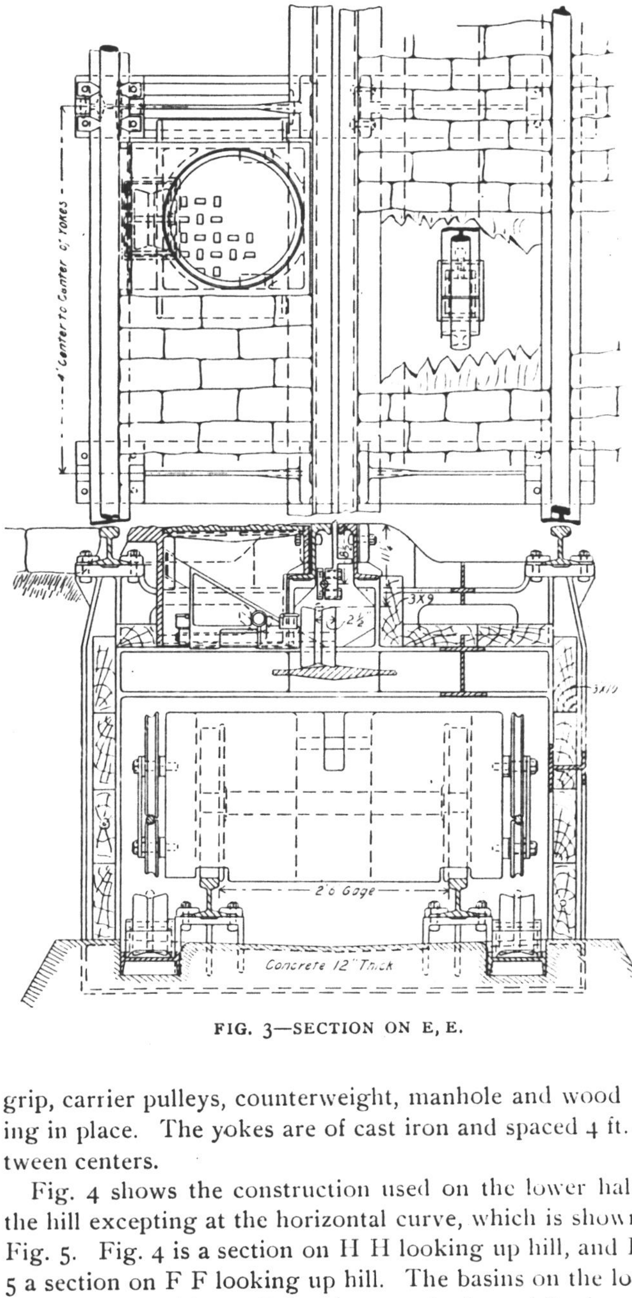

4' Center to Center of Yokes
3x9
2½
3x10
2'6" Gage
Concrete 12" Thick

FIG. 3—SECTION ON E, E.

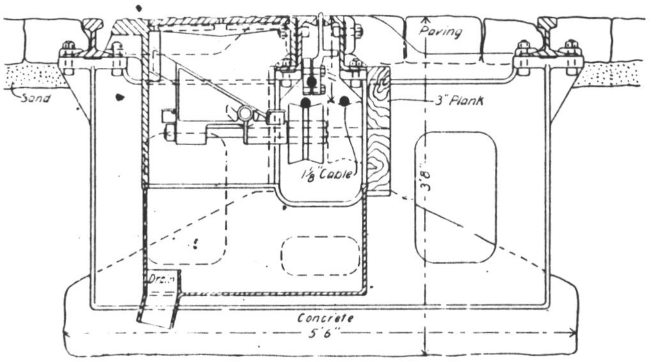

Paving
Sand
3" Plank
1¼" Cable
3'8"
Drain
Concrete
5'6"

FIG. 4—SECTION ON H, H.

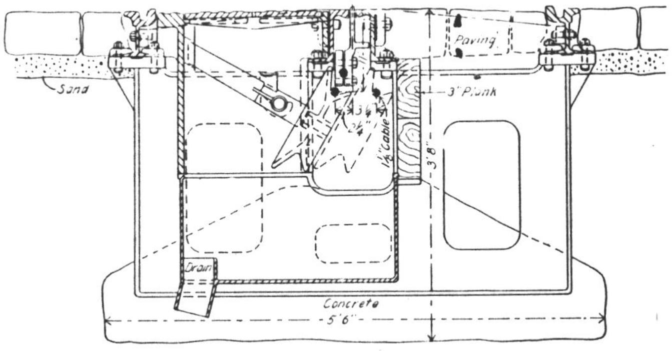

Paving
Sand
3" Plank
1¼" Cable
3'8"
Drain
Concrete
5'6"

FIG. 5—SECTION ON F, F.

grip, carrier pulleys, counterweight, manhole and wood siding in place. The yokes are of cast iron and spaced 4 ft. between centers.

Fig. 4 shows the construction used on the lower half of the hill excepting at the horizontal curve, which is shown in Fig. 5. Fig. 4 is a section on H H looking up hill, and Fig. 5 a section on F F looking up hill. The basins on the lower portion of the hill are all double cover basins, while those on the upper portion are single cover basins, shown in plan in Fig. 3. These sections (Fig. 4 and 5) show the yokes, curve and carrier pulleys, manholes, rails, drain and siding as assembled.

Fig. 6 shows the head counterweight, the right hand end being the up-hill end, with the parts assembled. The counterweights are carried on 20-in. wheels, with 3-in. axles. The axle boxes are of the best phosphor bronze and beneath the bronze box is an oil cellar which holds about one pint of oil. In the oil cellar is a wooden feeder which bears against the axle, the whole length of bearing, thus giving continuous and perfect lubrication. Above the boxes is a half elliptic steel spring, to take the shock of uneven track and poor joints. The 48-in. sheave which is placed in the counterweight is provided with a cast steel stud to run upon. This stud is hollow and is filled with oil, which is fed by a woolen wick, thus insuring continuous lubrication. All bearing surfaces are made large to insure continuous wear. The weight per inch of bearing surface is in no case more than 200 lbs.

The gripping device is entirely automatic in operation and is of the same design as those which have been used in Providence since October, 1895, and have worked with entire satisfaction. The device is shown in Fig. 7. The portion fastened to the cable is a flowed steel casting, comprising a slotted shoe carried above the slot rails and a blade 18 in. long, which projects 8½ in. into the conduit and is permanently clamped to the cable, by means of a plate and nine ¾-in. set screws. The shoe is 31 in. long; in the center is a slot bored out to the section shown at A, Fig. 7; at the ends the shoe is flared to guide the grip blade into the slot, and at the sides is provided with lugs to which are pivoted the releasing levers. The releasing levers are kept in their normal positions by brass springs, and are tripped by striking pins which are placed at the ends of the incline. The grip blade is 9½ in. from the center of the bearings in the car to the center of the enlarged lower portion engaging the grip. It is steel casting hung in bearings on the grip car so as to be free to swing sidewise. The automatic working will be readily understood from the drawing.

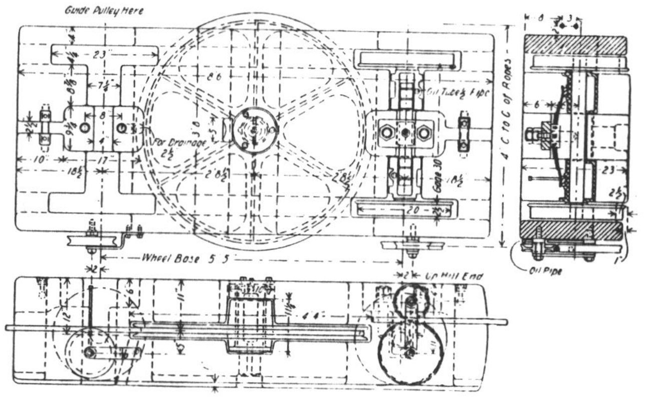


FIG. 6—COUNTERWEIGHT.

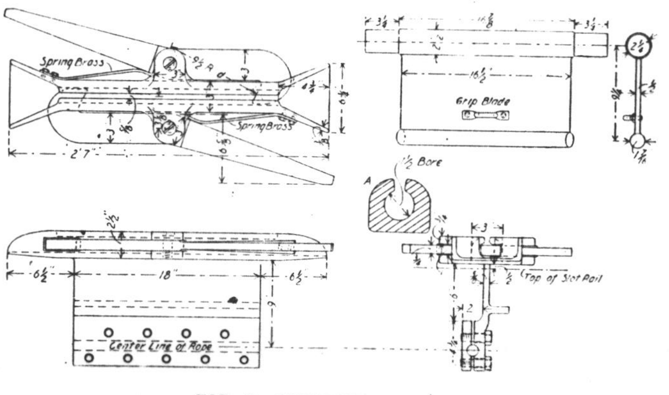
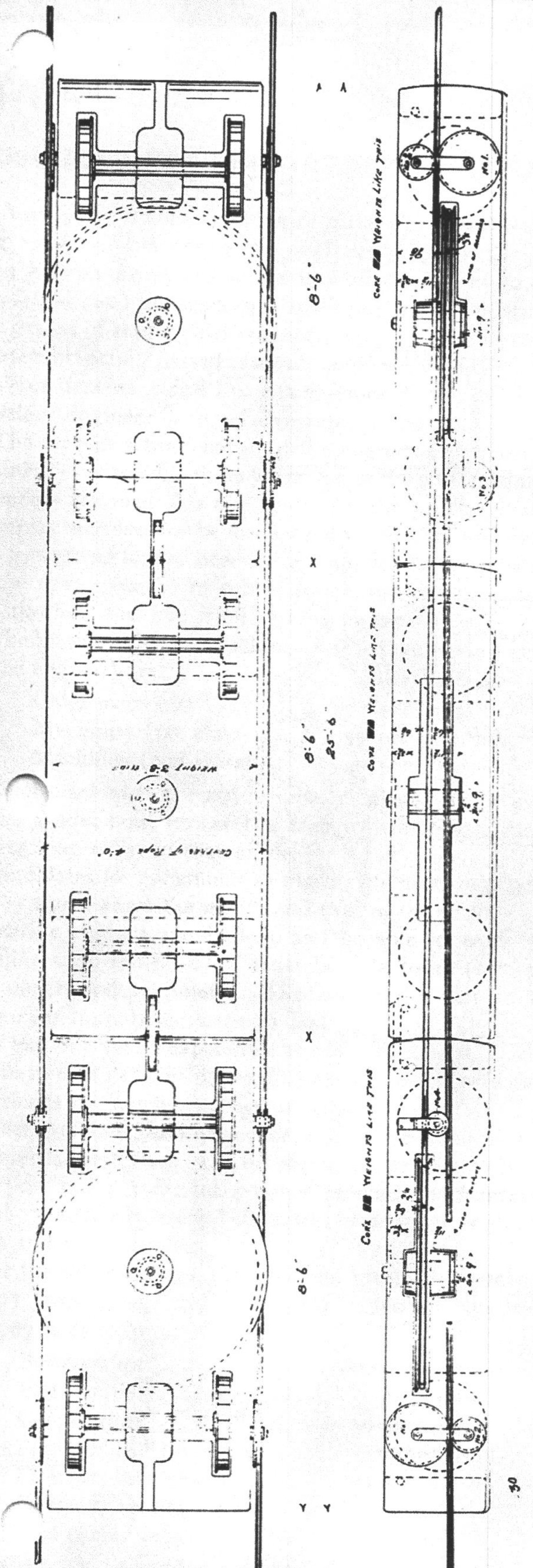


FIG. 7—GRIPPING DEVICE.

All the castings and machine work are being furnished by the Sessions Foundry Company, of Bristol, Conn., which probably has the largest and best equipped foundry in New England. It was awarded the contract on March 12, and guaranteed to deliver all material, finished, May 20, thus having but 59 working days to turn out about 270 tons of material and finish the necessary machine work.

For the foregoing description and the drawings we are indebted to Mr. Bronsdon.



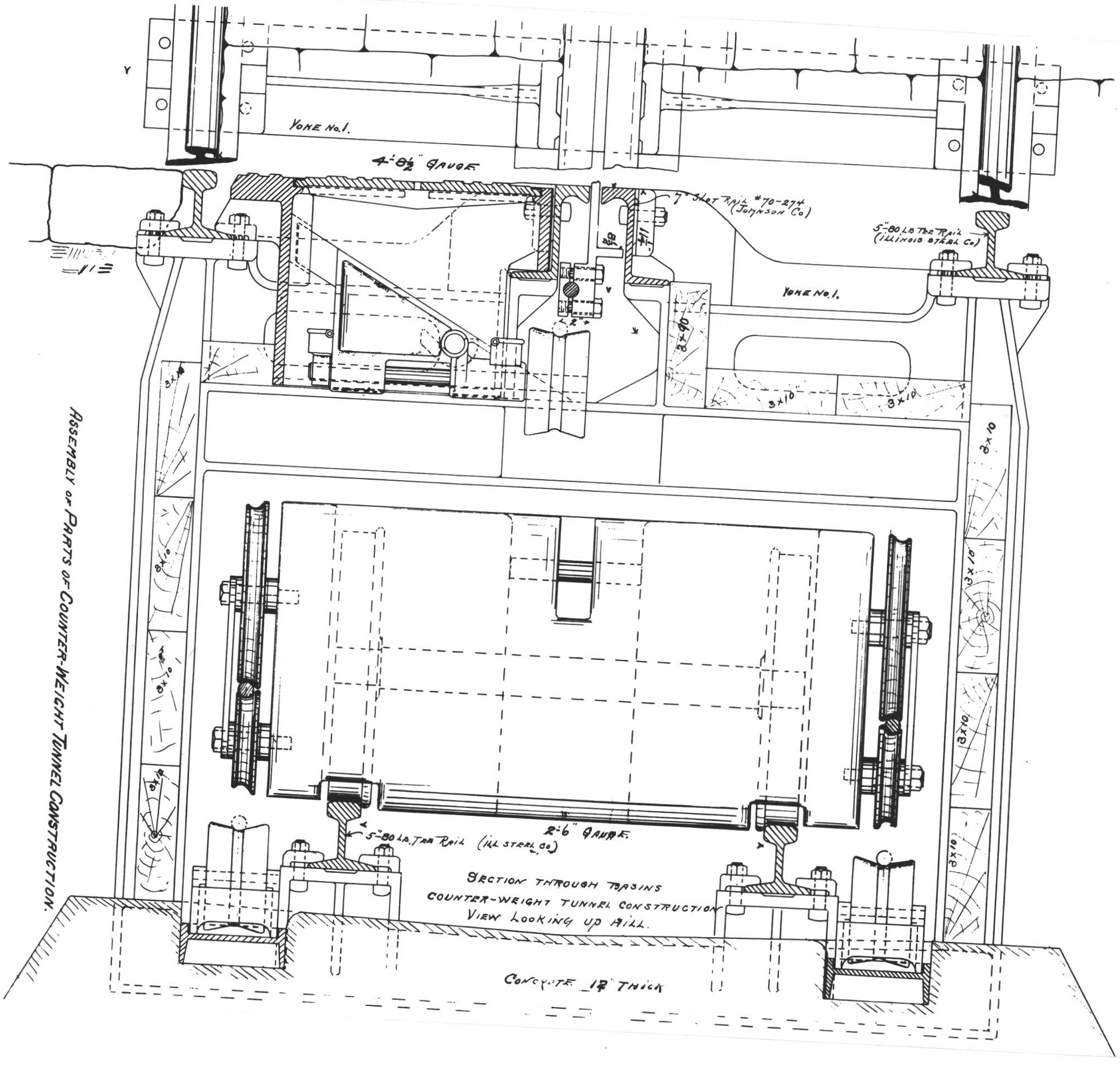
Top and side elevations of a counterweight unit. (Paul Joyce collection)

meals per day). Applicants must present themselves at the receiving ships or navy yards for examination at their own expense. No person who does not understand and speak the English language can be enlisted. Preference will be given to those who can read and write and are of American birth or have declared their intentions of becoming citizens.

* * *

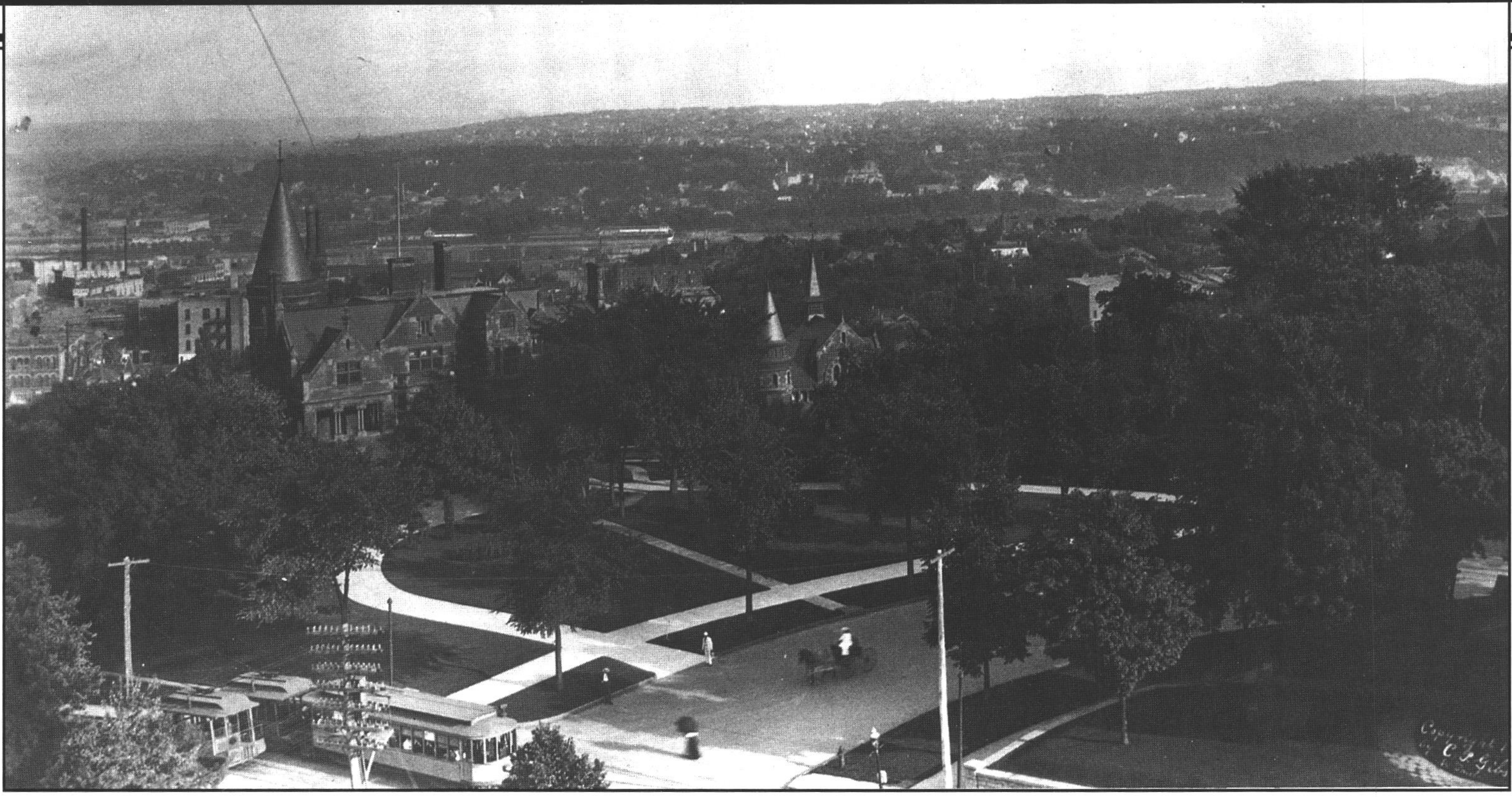
The case of the Detroit Citizens' Street Railway Company against the Detroit Electric Railway Company and the city of Detroit was argued before the United States Supreme Court on April 19 and 20, and a decision is expected some time during the current month.

ASSEMBLY OF PARTS OF COUNTER-WEIGHT TUNNEL CONSTRUCTION.



SECTION THROUGH BASINS
COUNTER-WEIGHT TUNNEL CONSTRUCTION
VIEW LOOKING UP HILL.

YOKE No.1.
4'-8½" GAUGE
7" SLOT RAIL #70-274 (JOHNSON Co)
5"-80 LB TEE RAIL (ILLINOIS STEEL Co)
YOKE No.1.
3x10
3x10"
3x10
3x10
3x10
3x10
3x10
3x10
3x10
3x10
3x10
2"
2'-6" GAUGE.
5"-80 LB. TEE RAIL (ILL STEEL CO)
CONCRETE 12" THICK



THE SELBY HILL COUNTERWEIGHT

Electric cars replaced all the horsecars in 1891 and left only the two St. Paul cable car lines as holdouts from the pre-electric era. The East 7th Street line with its 5 percent grade succumbed in 1893. Selby Hill was another matter. The grade was 16 percent, well beyond the limits of adhesion, and so the grip cars persisted until 1898. That was the year TCRT built its first double truck streetcar with capacity to replace a two-car cable train.

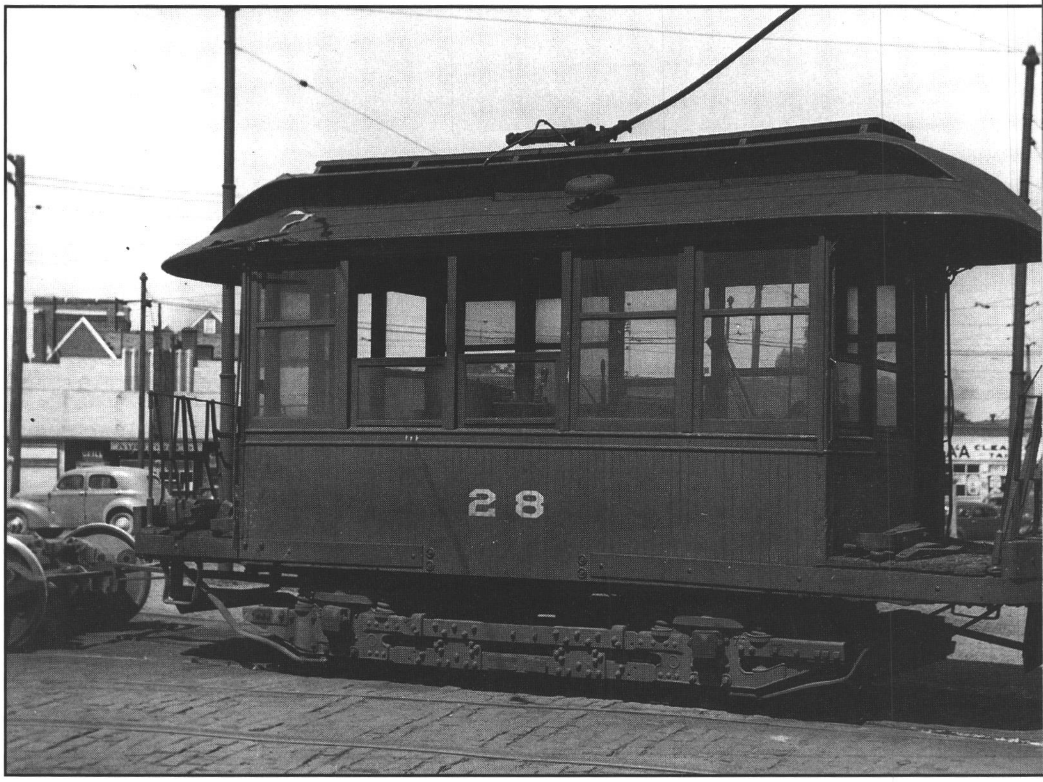
Even though the new cars were large and powerful, they had no hope of climbing the hill unassisted, and that was the purpose of the counterweight system. Three former cable cars were rebuilt as pusher cars. Going uphill, they pulled up behind the electric car and engaged a cable that was counterweighted to match the pair of streetcars. Both cars then used their electric motors, plus the force of the counterweight, to climb the hill. Since no coupling was involved, the electric car simply pulled away at the top of the hill.

A downhill electric car eased up against the waiting counterweight car and a small push from their electric motors sent them down the grade, with the counterweight preventing a runaway.

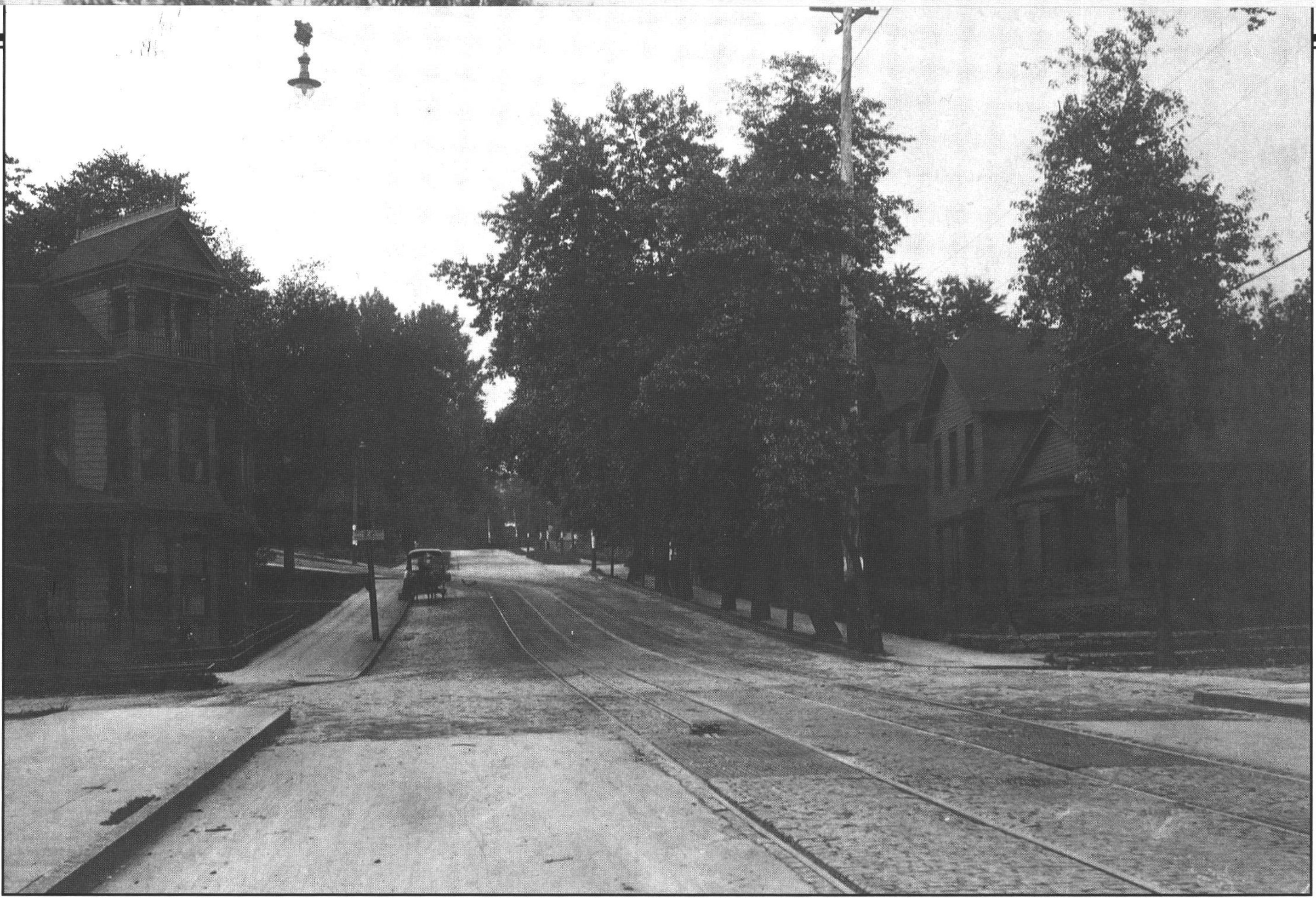
There were double crossovers at both ends of the counterweight, and either track could be used in either direction.

The counterweight system lasted until the 1907 opening of the Selby Tunnel reduced the grade to a manageable 7 percent. The three counterweight cars became shop shifters at Snelling and lasted until the end of operations, curiosities from another century.

This accidental photo of the counterweight was taken from the Kittson mansion, now the site of the St. Paul Cathedral. A streetcar has just been pushed up what would normally be thought of as the downhill track. In fact, the tracks were bi-directional. On the other track a counterweight car waits for an eastbound streetcar to lead down the hill. Minnesota Historical Society collection.



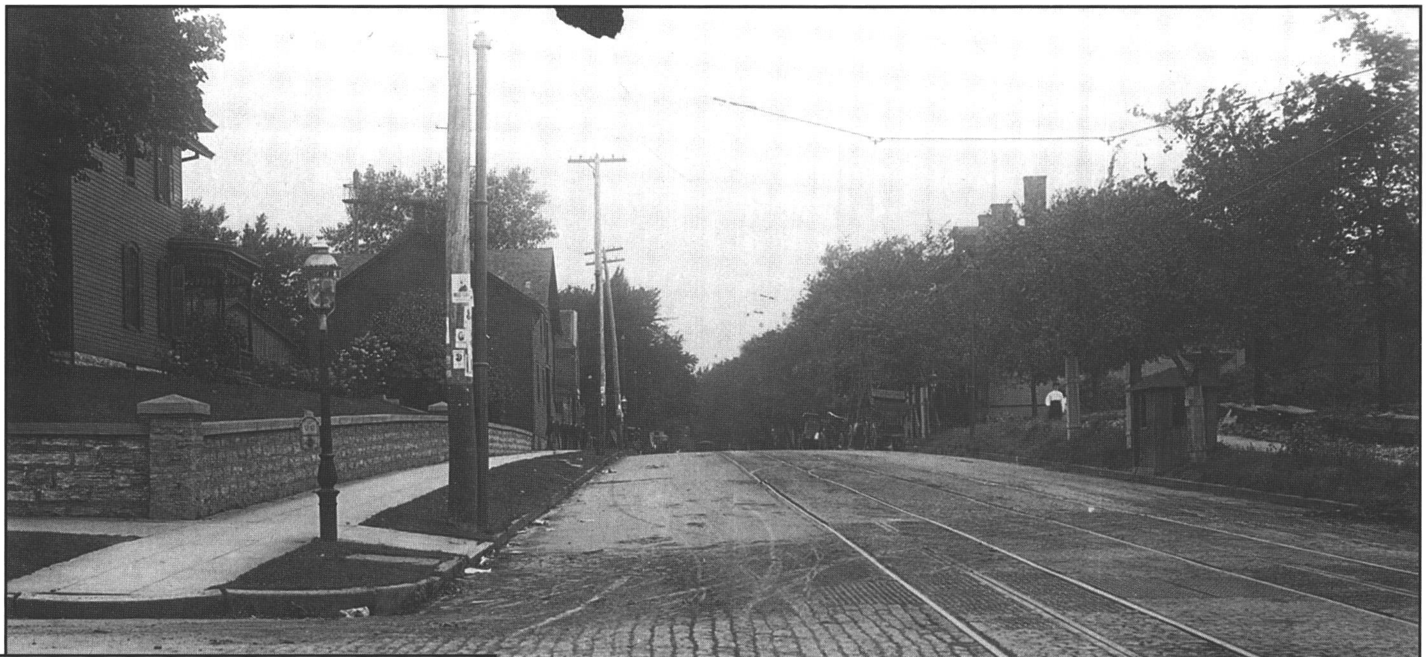
The three counterweight cars were rebuilt from cable cars, probably delivered in 1888. When the counterweight was replaced by the Selby Tunnel, they became switchers or "shifters" at Snelling Shops. #27 lasted until 1952, and #26 and 28 to the end of streetcar operations in 1954. They were by far the oldest equipment on the property. MTM collection.

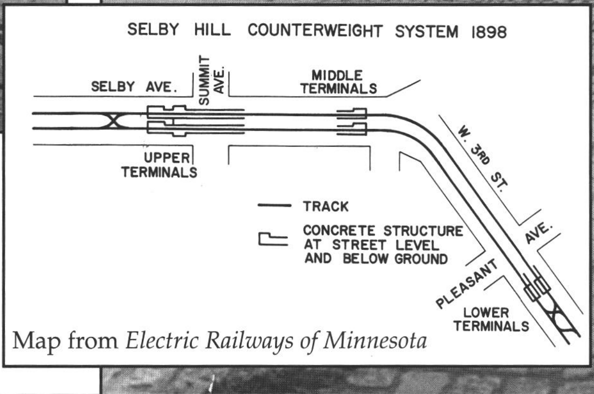


Above: The bottom of the counterweight at Pleasant Avenue. Minnesota Historical Society collection.

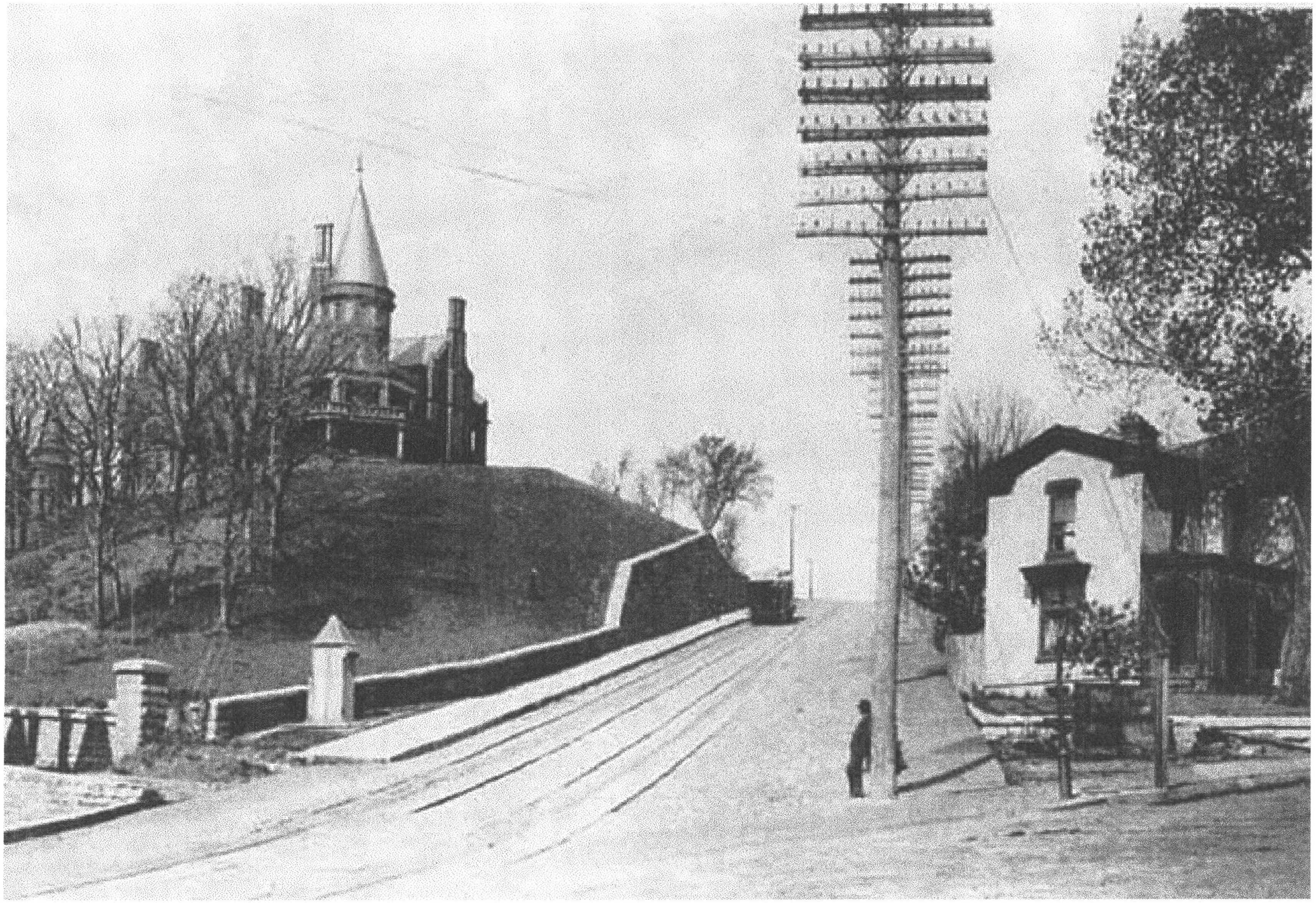
Below: The top of the counterweight at Summit Avenue. Hennepin County Historical Society collection.

NFECTING CO.

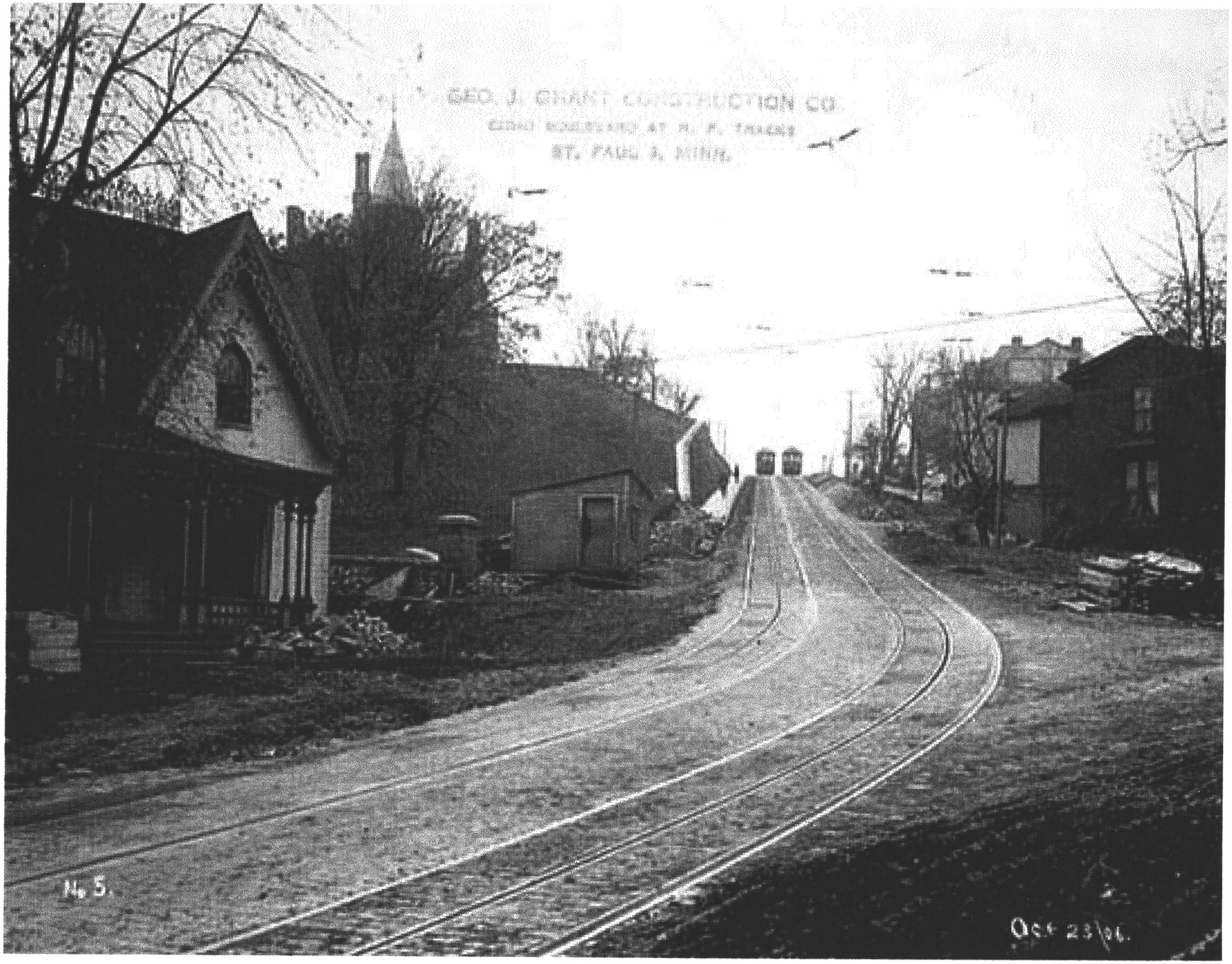



SELBY HILL COUNTERWEIGHT SYSTEM 1898
SELBY AVE.
SUMMIT AVE.
MIDDLE TERMINALS
UPPER TERMINALS
W. 3RD ST.
AVE.
PLEASANT
LOWER TERMINALS
TRACK
CONCRETE STRUCTURE AT STREET LEVEL AND BELOW GROUND

Map from *Electric Railways of Minnesota*



MHS HE4.4Sp11 NEG#24285


GEO. J. GRANT CONSTRUCTION CO.
COMO BOULEVARD AT N. P. TRACKS
ST. PAUL 3, MINN.
No 5.
Oct 23/06.

10-23-06 MHS HE4.4Sp12 NEG#36405

THE ST. PAUL CITY RAILWAY COMPANY

CABLE TRACK

UNIT COST ESTIMATE TO BUILD ONE MILE OF CABLE TRACK

Item	Units	Unit Cost	Total Cost
Excavation	4918 Cu. Yds.	$ .50	$ 2,459.00
Concrete including forms	2012 " "	7.30	14,687.60
Yokes - 4'0" C-C	1320 (519# -2¼¢)	11.68	15,417.60
Track Rails (54# per yd.)	84.86 Tons	50.00	4,243.00
Slot Rails (52# per yd.)	81.71 "	50.00	4,085.50
Rail Joints	336	.80	268.80
Slot Rail Joints	336	.50	168.00
Tie Rods & Washers	1640	.20	528.00
Bolts	16000 Lbs.	.035	560.00
Manhole Frame & Cover	66800 " 167-400#)	.02	1,336.00
Sand Plates	2640	1.25	3,300.00
Carrying Wheels & Brackets	167	6.00	1,002.00
Plates for Tr. Rail	30,000 H.B.M.	30.00	900.00
Hauling Yokes	343 Tons	1.00	343.00
Yoke Wedges & Shims (Steel)			225.00
Grip Hatches	1	125.00	125.00
Hand Pickups	1	40.00	40.00
Track Laying	5280	1.00	5,280.00
Setting Yokes	342.54 Tons	5.00	1,712.70
Catch Basin & Pipe Connections	12	60.00	720.00
Oak Blocks(Shims for Tr.Rail)	7920	.03	237.60
Depression Pulleys	1	50.00	50.00
	Total =		$ 57,688.80
Expense of Construction, Organization, Engineering, Superintendence, Incidentals, etc. 15%			8,653.32
Total (Exclusive of 1¼" Steel Cable)			$ 66,342.12
Scrap Value Deducted			
Yokes	342.54 Tons		
Track Rails	84.86 "		
Slot Rails	81.71 "		
Manhole Frames & Covers	33.40 "		
	542.51	10.00	5,425.10
	GRAND TOTAL		$ 60,917.02

070522B Mimeo.

THE ST. PAUL CITY RAILWAY COMPANY

CAPITAL INVESTED IN THE DEVELOPMENT OF THE PROPERTY

VALUE OF CAPITAL INVESTMENT IN THE SELBY HILL COUNTERWEIGHT SYSTEM SUPERSEDED AND DESTROYED AT THE TIME OF THE SELBY TUNNEL CONSTRUCTION.

	Unit	Quantity	Unit Price	Cost
EXCAVATION				
Trench	Cu.Yd.	3,308	$ .70	$2,315.60
BACKFILL	" "	1,099	.15	164.85
FOUNDATION				
Concrete	Cu.Ft.	18,576	.222	4,123.87
Brick	M	262	18.00	4,716.00
STRUCTURAL STEEL & IRON WORK				
Bolts	Lbs.	7,376	.05	368.80
C.I. Yokes, Basins, etc.	"	526,896	.0325	17124.12
Channels & I Beams	"	5,068	.04	202.72
Phos. Bronze Castings	"	572	.18	102.96
Truck Wheels & Axles (Weight 19,680#)	Each	16	90.00	1440.00
Car Springs (Weight 800#)	"	16	2.00	32.00
Cable 1-1/8" Steel (Weight 10,000#)	Lin.Ft.	5,000	.16	800.00
TRACK				
5"-80# T. Rail	Ton	80	40.00	3200.00
7"-70# Z Bar Slot Rail	"	46.66	50.00	2333.00
6"-92# Guard Rail	"	10.18	41.50	422.47
PAVING				
Asphalt on Concrete Base	Sq.Yd.	2,058	1.90	3910.20
Timber Framing				
3"x 8" and 3" x 10" Material	M.Ft.B.M.	48	35.00	1680.00
GRIP CARS				
Complete with 2-25 H.P. Motors	Each	2	2400.00	4800.00
	TOTAL			$47,736.59
Expense of the Construction Organization, Engineering, Superintendence, Incidentals, etc. 15%				7,160.49
	TOTAL			$54,897.08
Deduct Scrap Value 422 Tons at $10.00				4,220.00
	VALUE SUPERSEDED			$50,677.08

THE ST. PAUL CITY RAILWAY COMPANY

CAPITAL INVESTED IN THE DEVELOPMENT OF THE PROPERTY

DETAIL OF QUANTITIES

SELBY HILL COUNTERWEIGHT SYSTEM

EXCAVATION

Upper part for trench,	492'x 21' x 6'	2,296	Cu. Yds.
Lower " " "	465'x 21' x 3'	931	" "
Lower End for sheaves	21'x 15' x 3'	63	" "
At center for Tension Weight	9'x 6'x 9'	18	" "
	TOTAL	3,308	" "

BACKFILL

Upper part of trench (both sides)	2-492'x 1'6"x 6'	328	Cu. Yds.
Lower " " " " "	2-465'x 1'6"x 3'	465	" "
Upper " " " (Center)	450'x 2'6"x 5'	200	" "
Lower " " " "	450'x 2'6"x 2'	83	" "
Upper End	21'x 2' x 6'	9	" "
Lower End	21'x 2' x 9'	14	" "
	TOTAL	1,099	" "

FOUNDATION

Upper part	1	Concrete	Slab	484'x 21'x 1' Thick	10,164	Cu.Ft.
Lower "	2	"	"	465'x 6'(Avg)x1'6" Thick	8,370	" "
Upper End	2	"	"	8'6" x 2'6" x 1'	42	" "
				TOTAL CONCRETE	18,576	" "

Upper part	4	brick	walls	490'x 4' (Avg) x 16" Thick	188.2	M
Lower part	2	"	"	465'x 2' " x 16" "	44.6	"
Upper End	2	"	piers	6'x 6'x 6'	7.8	"
Lower End	2	"	"	12'x 5'x 3'	6	"
" End	2	"	walls	13'x 4'x 12" Thick	1.7	"
" End	2	"	"	13'x 5'x 12" "	2.2	"
" "	2	"	"	5'x 3'x 12" "	.5	"
Upper "	1	"	"	20'x 9'x 16" "	4.3	"
Center	2	"	"	4'x16'x 16" " (For weight)	3	"
"	2	"	"	6'x13'x 16" " " "	3.7	"
				TOTAL BRICK	262.0	"

STRUCTURAL STEEL & IRON WORK TOTAL

Bolts W. I.	7,376	Lbs.
Basins, C. I.	65,862	"
Counterweight, C.I.W.I. & Steel	119,146	"
Carrier Pulley, Frame & Base C.I.	3,780	"
Cable Clamps C.I. and W. I.	320	"
Covers and Frames, C.I.	27,140	"
Clips, C. I.	5,200	"

THE ST. PAUL CITY RAILWAY COMPANY

CAPITAL INVESTED IN THE DEVELOPMENT OF THE PROPERTY

DETAIL OF QUANTITIES

SELBY HILL COUNTERWEIGHT SYSTEM

STRUCTURAL STEEL & IRON WORK: (Continued)

Curve Pulleys & Brackets, C. I.	7,440	Lbs.
Grip Hatch, C. I.	992	"
Pedestals & Washers, C. I.	5,882	"
Straight Pulleys & Sheaves, C. I.	8,790	"
Tension Sheave & Weight, C. I.	4,666	"
Tie Plates, W. I. and C. I.	680	"
Wall Plates, C. I.	1,398	"
Wedge, C. I.	3,000	"
Yokes, C. I.	272,690	"
TOTAL	526,896	"
CHANNEL IRON & I BEAMS, TOTAL	5,068	"
PHOS. BRONZE CASTINGS TOTAL	572	"

16 TRUCK WHEELS AND AXLES
16 CAR SPRINGS

5,000 Lin.Ft. 1-1/8" 6-Strand, 19 Wire Steel Cable,

TRACK

6,000 Lin. Ft. 5"-80# T Rail	80.	Ton
4,000 " " 7"-70# Z Bar Slot Rail	46.66	"
664 " " 6"-92# Guard Rail	10.18	"

PAVING

Asphalt on Concrete Base 19'x 975'	2,058 Sq.Yds.

TIMBER FRAMING

3" x 8" and 3" x 10" Material	48 M.Ft.BM

GRIP CARS

2 - Complete with 2 - 25 H.P. Motors,

CONTENTS OF BACK POCKET

1890 U.S. Census (July 1st)

Horse Cars 22,408

Total Cost $195,121,683

Line Miles 4061.94 $48,037 / mile

Track Miles 5661.44 $34,465 / mile

Cable Cars 5,089

Total Cost $76,346,618

Line Miles 283.22 $269,566 / mile

Track Miles 488.31 $156,349 / mile

Electric Cars 2,895

Total Cost $35,830,950

Line Miles 914.25 $39,192 / mile

Track Miles 1261.97 $28,393 / mile

Steam 2,128 cars

Total Cost $82,058,039

Line Miles 524.06 $156,581 / mile

Track Miles 711.30 $115,363 / mile

SPCR

Cable Lines

Tangent Track		$900,657.85
〃 〃 Paving		138,606.20
Special 〃 & 〃		8,400.75
Power Station Equipment		163,088.27
Rolling Stock		90,000.—
Buildings		59,950.—
		1,360,703.07
Administration, Taxes, Interest	15%	204,105.46
		1,564,808.53

Fillmore Hill Counterweight Device 50,677.08

St Paul
Cable Construction Cost
A. L. Drum

Tangent Track	14.785 miles @ $66,342.12 =		$980,868
Paving			$138,606
Special Track & Paving			
4th & Broadway	1 #10	$850	
Selby & Dale	Barn Layout	850	
Selby & Milton	3 #10	2550	
Selby & Fairview	1 #10	850	
7th & Wabasha	1 #10	850	
7th & Duluth	1 #16	3480	
		9430	
	Plus 15%		10,844
Powerhouse Equipment (includes cables)			
Selby & Dale		$83,277	
7th & Duluth		79,811	
			163,088
Buildings			
Selby & Dale	52900 + 10%	58,190	
7th & Duluth	14880 400 1200		
	16480 + 10%	18,128	
			76,318
Rolling Stock			
18' Grip Cars	38 @ $875 =	$33,250	
16' Closed Trailers	34 @ $775 =	26,350	
25' Open Trailers	32 @ $950	30,400	
			$90,000
			1,459,724
Org, Admin, Interest, Taxes etc	15%		218,959
Total Cost			1,678,683

RESULT $1,678,683 ÷ 7.39 miles of line = $227,156 per mile

Cable Line Mileage

A. L. Drum	ST Miles	Line Miles
Selby ave		
4th St - Broadway St to Pleasant ave.	2.346	
} Pleasant to Selby & College ave.	.129	
Selby Ave - College Ave to Nina ave	.415	
} Nina ave to Dale St	1.454	
} Dale St to Chatsworth St	1.542	
	5.886	2.94
Selby ave - Chatsward St to Fairview Ave.	3.553	1.78
	9.439	4.72
E. 7th St.		
E. 7th St. - Wabasha St to Duluth St.	5.346	2.67
	14.785	7.39

[Selby ave line: Broadway to St. Albans 4.662]

[1891 cut back to Chatsward St (Trumbull) 5.782]

[1890 U.S. Census Total Miles of Track 10.02]

Frank Trumbull

1-18-1893

Selby Ave.	5.782	2.891
E. 7th St.	5.370	2.685
	11.152	5.576

[1894 Directory, after E. 7th St electrification 5.874]

[June 1894 Frank Trumbull 6.263]

Powerhouse Equipment Detail

	Selby Ave		E. 7th St.
Foundation	$6250		$6250
Boilers & Settings			
4 Wood @ 600 HP (FT)	7200	3 B&W @ 208 HP (WT)	10936
Breeching & Connection	300		312
Stacks 6' x 150' Brick	7950	6' x 150' Brick	7950
Heaters, Tanks etc	4500		4500
Pumps	300		312
Engines			
2 Corliss 28 x 60	15,285	Same	15,285
1 35 KW Lighting Set	1200	Same	1,200
Piping & Covering	2,880		2995
Cable Machinery			
2 sets cable winding	16,545	2 sets	16545
Misc			
Oil Burning attachments	960		720
Tools	480		499
Cable 1¼" 49,906 LF	14972	1¼" 28,453 LF	8536
	78,822		76040
Org & Engr 10%	7882		7604
	86,704		83644

St Paul
Cable Construction Cost

Buildings

Selby Ave 171-0 x 172-6 x 56 2 STY BRK 40,000

" " 50-0 x 172-0 x 24 1 STY BRK 12,900
 221-0 x 173-

E 7th St 1 STY BRK 80 x 124 = 9920 SF @ 1.50 = $14880

$12900 / 8600 SF = 1.50 per SF
50 x 172 = 8600 SF

Paving

E 7th St Granite 5.194 x 5103 SY = 26504.98 SY @ 1.88 = 49,829.36
None on the bridge .152 - -0-
 5.346

49829.36
15% 7474.40
57303.76

Selby Ave Remainder 81302.44
138,606.20

alternate calculation
Selby Ave 171 x 172½ = 29498 SF
$40,000 ÷ 29498 SF = 1.356 per SF
E. 7th St 9920 SF @ 1.356 = $13,452

Buildings

Selby Ave.		
PH&CH	171-0 x 172-6 x 56-0 (2 sty.)	40,000
PH addn	50-0 x 172-0 x 24-0 (1 sty.)	12,900
		52,900
Org, Eng, Supt	10%	5,290
		58,190
E 7th St.		
Frame Shed	26 x 32 x 15 H	400
Artesian Well		1200